



BYZANTINE FORTIFICATIONS

An Introduction

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Clive Foss
David Winfield

UNISA

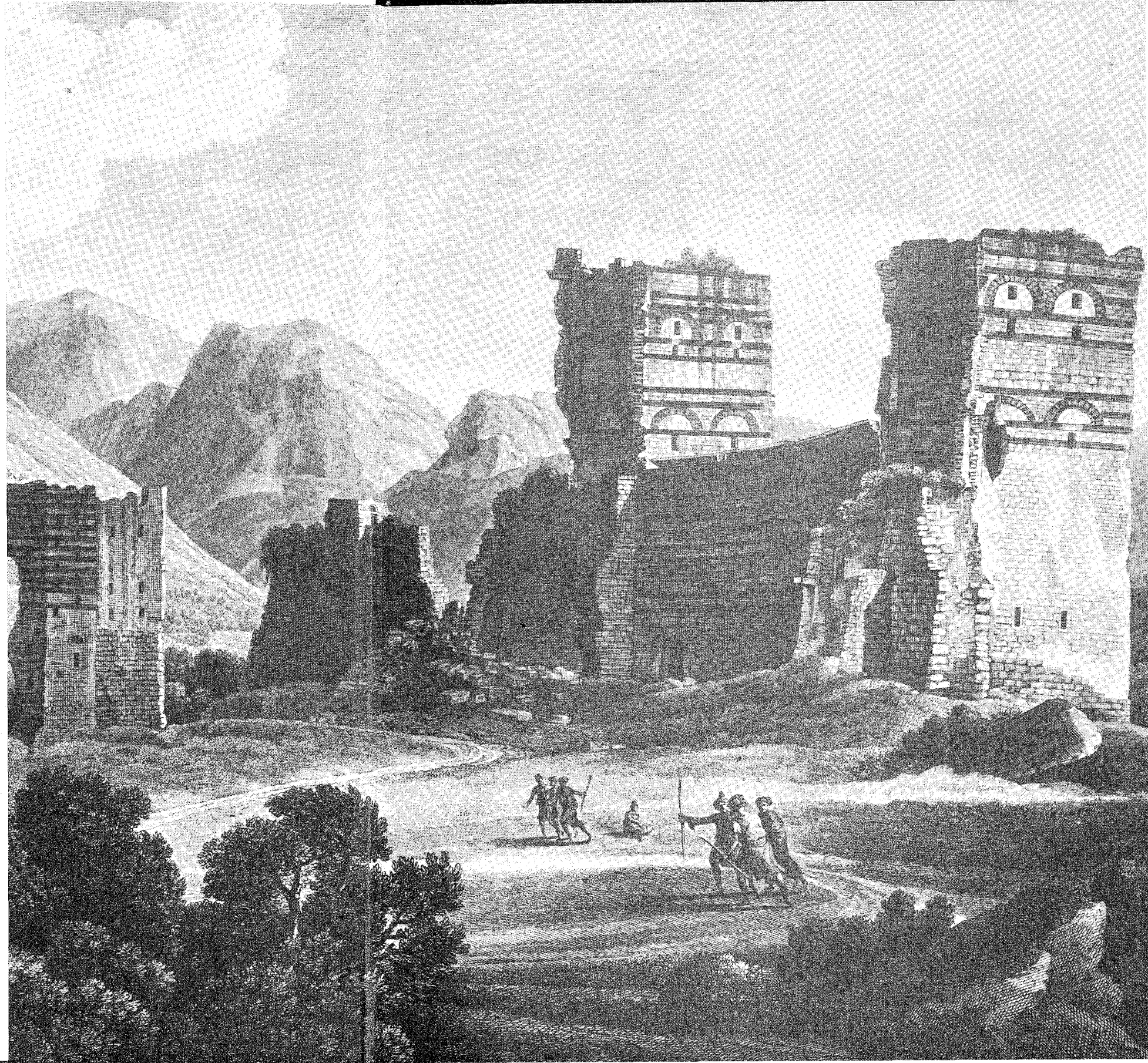
Clive Foss
David Winfield

The two authors have in this book provided an introduction to a subject which has never been studied before as a whole. Byzantine fortifications form not merely a branch of the art of war or military history, but are of considerable significance in understanding an entire civilisation. During long centuries the Byzantine empire was forced to struggle for its very existence, and its survival owes much to its skill in developing and constructing systems of fortification.

In fact, fortifications of all kinds were constructed throughout the Empire on numerous occasions from the third through the fifteenth centuries. In terms of quantity, they are the most numerous relics of the whole period, and in size often the most impressive. They form an integral and fundamental part of the historical and architectural record, but rarely appear in the standard works.

With this introduction the authors wish to give an indication of the quantity and nature of what is basically the largest body of unknown Byzantine monuments. They consider the problem which the material presents and the methods by which they may be resolved. Among others, the relation between Byzantine, Roman, western medieval and crusader fortifications are discussed, along with methods of construction, methods of defence and questions of chronology. The latter are especially important because unless the monuments can be assigned to a period, they can give little substantial information to the historian or student of art or architecture.

The book is divided into three parts. Part 1 forms a general introduction to the subject by treating the relation between Roman and Byzantine fortifications; by examining the work of Justinian; by surveying Byzantine fortifications and their method of construction, especially in eastern Asia Minor, and by relating the monuments of the period to those of the Crusaders and the medieval West. Part 2 is a detailed study of two of the most famous walls, at Constantinople of Nicaea, to show the complexity of the subject – notably of styles of masonry and techniques of defence – and to suggest ways of dealing with the numerous problems which it presents. Part 3 is a summary of forty castles and city walls in a limited area (almost all are in western Asia Minor) to illustrate the wealth of material and the ways it might be classified for understanding its historical and architectural development.



Byzantine Fortifications

AN INTRODUCTION

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*To my friends in Johannesburg, Pretoria,
Bloemfontein and Cape Town*

CLIVE FOSS

To Matthew and Johanna Farrer

DAVID WINFIELD

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Preface: Part One

Castles have been of interest to me since my undergraduate days, but it was only while living and working in Turkey in the 1950's and 1960's that I began to look at them in a more serious light. A part of my leisure time while working at Trebizond was devoted to explorations of churches and castles, and this material appears in the publication by A.A.M. Bryer and D. Winfield. *An Historical Geography of Pontus*, (Washington D.C., 1985). Subsequently a move to work in Cyprus and the opportunity to travel in Syria and on the south coast of Turkey, allowed me to look at some Crusader castles, and some that seemed not-so-Crusader, although attributed to the Franks.

When I returned to academic life at Oxford, I was asked to lecture on Byzantine castles for a Byzantine seminar, and on Crusader castles for a seminar on the Crusades. It was necessary to sort out ideas and consider problems for these two lectures, and the present study has grown from this work. There are bound to be shortcomings in any study which tries to bridge the gap between the eastern and western medieval worlds, and I am well aware that breaches can be made in numerous weak places. In particular, I have no personal knowledge of Spanish, Italian, or German castles, and a move to non-academic work has meant that I have been unable to keep up with the increasing volume of publications on fortifications.

My thanks are due to Edinburgh University and to Dumbarton Oaks (Harvard University) for both of whom I worked in Turkey and Cyprus when the field work for this study was done. I am grateful to the Warden and Fellows of All Souls College, Oxford, for a Visiting Fellowship in 1973 which happily brought me home after 19 years abroad, and to the Warden and Fellows of Merton College, Oxford, for a Senior Research Fellowship from 1974 to 1977. For additional support I am grateful to the Trustees of the Leverhulme Fund and to the British Academy who supported my work on Byzantine wall paintings, but unwittingly I fear, on fortifications as well. On my travels I have enjoyed the company of the late Lawrence Strangman, and of Matthew and Johanna Farrer, and I have benefited from their observations. I am grateful to Mrs Ann Worrall for typing the manuscript. Finally, I am happy to thank my wife who has patiently looked at so many castles with me.

D. WINFIELD

Oxford
May 1985

Preface: Parts Two and Three

Two decades ago, my friend and teacher, Sterling Dow, was instrumental in the award of a fellowship to the American School of Classical Studies in Athens, where I made the acquaintance of Byzantine fortresses and often, in total ignorance, had to prepare reports on them. That year included two happy trips to Turkey which filled out the picture of Byzantium and its monuments, and encouraged further research. Much intervened before the present work began with a visit to castles in Lydia made possible by the support of the Centre Nationale de Recherche Scientifique. The work made considerable progress the following year when I studied the fortresses of Mysia with my old friend, Hans Buchwald, whose propensity for what had before seemed like interminable notes and photographs became a subject of emulation rather than astonishment. That visit was made possible by an invitation by the Department of National Education to lecture in the Republic of South Africa, a country at such a remove that stops in Turkey could easily be accommodated *en route*. The American Council of Learned Societies provided a generous grant for what had by then become a serious project; thanks to that, it was possible to visit many castles over a large region, exploration which could hardly have been accomplished without the tireless and good-natured efficiency of my driver, Nail Ildem of Izmir. A further sojourn in South Africa, this time to lecture at UNISA, made two further stays in Turkey possible, much of the time spent in Istanbul and Nicaea, and provided ideal working conditions for the first stages of organising the material. During much of this time, the Sardis Expedition gave generously of its hospitality and provided funds for study of the immediate region, and occasionally a vehicle with helpful colleagues. I am indebted at various stages of this work to Mutahhar Başoğlu of Bozdağ for his help and interest, to Professor Peter Elder of Harvard for offering a convenient and congenial place to work, and to Miss Eva Chou for some typing and much moral support.

My sincere thanks, therefore, to all who have helped, accompanied or shared in this work.

Paris
May 1983

CLIVE FOSS

Introduction

Two authors, with two viewpoints, have here attempted to provide an introduction to a subject which has never been studied before as a whole. Byzantine fortifications form not merely a branch of such unfashionable realms as the art of war or military history, but are of considerable significance in understanding an entire civilisation. During long centuries, the Byzantine empire was forced to struggle for its very existence, and its survival owes much to its skill in developing and constructing systems of fortification. Many other factors, of course, were involved, not least the existence of an organised central government which continued to function through the darkest periods, the personality of individual emperors, the power of faith, or the relative strength of the empire at a time when its enemies were weak. All of these are well known and form a part of the exiguous historical record of the age. The present subject, however, is virtually unknown, beyond the general notion that the Byzantines needed fortresses to protect themselves from the Arabs and later the Turks, and that the walls of Constantinople were instrumental in preserving the capital against all attacks for some 800 years.

In fact, fortifications of all kinds were constructed throughout the Empire on numerous occasions from the third through the fifteenth centuries. In terms of quantity, they are one of the most numerous relics of the whole period, and in size, the most impressive. They form an integral and fundamental part of the historical and architectural record, but rarely appear in the standard works. On the contrary, it would seem from these that the Byzantines built little but churches, an impression which may swiftly be rectified.

We do not propose here to deal with more than a fraction of this vast mass of material, or even adequately to explore its place in architecture or history. Rather, we hope to provide an in-

roduction – hence the title of this volume – so that the quantity and nature of what is basically the largest body of unknown Byzantine monuments may be appreciated. In the process, we shall be concerned with the problems which the material presents and the methods by which they may be resolved. Among others, the relation between Byzantine, Roman, Western medieval and Crusader fortifications will be considered, along with methods of construction, methods of defence and questions of chronology. The latter are especially important because the monuments, in a sense, are useless unless they can be assigned to a period – not perhaps to the traveller who will have the pleasure (sometimes after considerable effort) of spectacular views from the steep hilltops they defended, but to the historian or student of art or architecture, for whom an undated building can give little substantial information.

The book is divided into three parts, each of quite different nature. **Part One** forms a general introduction to the subject by treating the relation between Roman and Byzantine fortifications; by examining the work of Justinian; by surveying Byzantine fortifications and their method of construction, especially in eastern Asia Minor; and by relating the monuments of the period to those of the Crusaders and the medieval West. **Part Two** is a detailed study of two of the most famous walls, at Constantinople and Nicaea, to show the complexity of the subject – notably of styles of masonry and techniques of defence – and to suggest ways of dealing with the numerous problems which it presents. Finally, **Part Three** is a summary of forty castles and city walls in a limited area (almost all are in western Asia Minor) to illustrate the wealth of material and the ways it might be classified for understanding its historical and architectural development. The general reader would be well advised to read Parts One and Three, with the introductory and concluding sections of Part Two, leaving the bulk of Part Two, which contains some highly technical discussion, to the end, if it is to be read at all. We hope that the specialist, on the other hand, will profit equally from all parts.

The work has two authors: D. Winfield wrote Part One and C. Foss the rest. Our respective parts were conceived and executed separately and only put together when we discovered that parallel studies were well advanced. The volume is therefore the product of two different points of view, and no effort has been made to homogenise it beyond the adoption of a common terminology. We have endeavoured, for example, to use a consistent definition of the periods, in which *Late antique* will denote the late third through the early seventh century; and *Byzantine* the seventh through the end of imperial rule in a given area; the *Dark Ages*, where they are discussed, denote the seventh and eighth centuries. In fact, the parts overlap very little; each author is naturally responsible for his alone, but we find ourselves generally in agreement.

Although this volume treats many castles, it exploits only a small percentage of the material and leaves much to be done. The lands which comprised the Byzantine empire are studded with fortresses, most of them unknown to scholarship. We have concentrated on a few areas, mostly in Asia Minor. The methods we use, and no doubt many others, could as well be applied to fortifications in Greece, the Balkans or elsewhere. We thus hope that the present work will fulfill one of our main aims, and stimulate further research.

The notes and bibliography will show that we owe much to our predecessors. There may be no general survey of the Byzantine material, but many scholars have carried out detailed and careful studies of individual fortresses or groups of them. In particular, we have drawn help and inspiration from the works of A.M. Schneider and his colleagues who made it possible to understand Constantinople and Nicaea; from the studies of Father de Jerphanion, who planned and analysed the walls of Ankara and many others; from the elegant plans and drawings of Albert Gabriel; and from the meticulous discussions of W. Müller-Wiener. They and many others have laid the groundwork for all further study on the subject.

This book has many limits, some imposed by choice, some by the state of present knowledge. First, it is not a manual of Byzantine fortifications, but an introduction; the time is still far away when a comprehensive survey may be undertaken. We hope here to show what may be done with some of the material, and to raise some questions about it. None of the examples we present constitutes full publication of a monument, but is rather intended to suggest directions which might be taken. We have deliberately excluded detailed study of fortifications outside Asia Minor, and even there have left much aside for further study. In particular, we have omitted fortresses which form part of the survey of medieval castles in Anatolia undertaken by the British Institute of Archaeology in Ankara; for the moment, this excludes two of the most important, Kütahya and Nicomedia. The choice of area, especially in Parts Two and Three is largely confined to regions which used brick. Its appearance in masonry is of great value in defining periods. We hope to have analysed these, but recognise that further research is needed in order to establish a typology of masonry without brick. Finally, we have presented the castles as monuments, often, perhaps, in artificial isolation from history and architecture; when more fortresses have been studied, a more profound approach will be possible, particularly in correlating the fortresses with churches, secular buildings, and historical developments. It is still early to discuss defensive systems of Asia Minor (to say nothing of Greece or the Balkans) in different periods, or the role of the castles in the militarised administrative system of the Dark Ages.

In other words, there is much to be done. We hope, nevertheless, that this work will provide a basis for further study by inviting further exploration of some of the problems we have approached, and by giving an idea of the wealth of material on the ground awaiting study. We will be pleased if the book is of use to historians and archaeologists, and if it encourages them to pursue the subject further.

The valuable study of A.W. Lawrence, *A Skeletal History of Byzantine Fortification*, *ABSA* 78 (1983) 171-227, appeared too late for us to take it into account. It is in many ways complementary to the first part of the present work, and offers material of considerable interest from a wide range of sites; we commend it to the reader.

Our common debts may be acknowledged with great pleasure. To Professor C.P.T. Naudé of the University of South Africa who supported publication of the work, and to UNISA who generously undertook to print it with sufficient illustration; to June Winfield who drew the plans with patience, skill and rapidity; to Cyril Mango and the Sardis Expedition for permission to reproduce photographs; and to innumerable villagers in Turkey who generously gave of their time and enthusiasm to show us the treasures which their land so abundantly contains.

*On some Features of Byzantine and
Western Medieval Fortification¹*

The Legacy of the Ancient World

It is commonly accepted that most of the principles governing the ancient and mediaeval arts of fortification were already known by about the 2nd century B.C. Methods of siege by mining, by rams, by siege towers, or by forms of artillery were in use in the Hellenistic period and to counter these there was no fundamental change in methods of fortification until the introduction of efficient canon, when military engineers were forced to think out the problems of fortification from a new point of view. The mechanisms of defence were of course improved in detail but the model remained the same, and towers, curtain walls and ditches performed the same fundamental roles in the days of the Assyrians and the Medes or the Hellenes as they did at Constantinople, Krac des Chevaliers, or Caernarvon.² The Byzantines profited from their reading of Philo of Byzantium and the Franks may have profited from Vegetius, both using texts that were hundreds of years old.³

The problem to be answered in any study of Byzantine and Crusader fortification is not so much a question of origin and innovation but rather a question of transmission and re-discovery, and the present essay seeks to define with more precision the history of some of the parts of fortification in the late Antique period up to c.600 A.D. and then more particularly in the neglected Byzantine period of c.600 – 1204 A.D.

As Rome gradually incorporated the countries around the shores of the Mediterranean into its Empire, it had experienced the difficulties of attacking Hellenistic fortifications,⁴ and it had inherited examples of both primitive and sophisticated fortifications from the Ancient World. The Byzantines, The Franks, and the Arabs, all in their turn had a common heritage in the fortifications of the Roman Empire, together with a surviving underlay of the earlier works of the Ancient World.⁵

One example of this common inheritance is the Roman rectangular ditched camp or walled fort or city (fig. 2). Examples of these are scattered from Britain in the north and Spain in the west to the Caucasus and the Euphrates in the east, and Africa in the south (fig. 3). The productive use of this inheritance either by repair of a Roman site or by the construction of new rectangular works may be seen by example. The Byzantines built new works on the rectangular plan in the 6th century in Africa (fig. 3)⁶ and they continued to use Roman sites and to build new ones on this plan in the Balkans, Asia Minor and Syria (figs. 4, 5, 6).⁷ A continued use of such sites rather than the building of new ones is perhaps more characteristic of the Byzantine period. The Arabs encountered and occupied both Roman and early Byzantine rectangular sites as their empire expanded northwards from Arabia and westwards along the shores of Africa. Their use of the rectangle in the construction of new works is attested in the Umayyad period by Kasr El Heir in the Syrian desert on the Baghdad road, by the palaces of Minya and Mshatta, and by the town of Anjar on the road from Beirut to Damascus (figs. 7, 8, 9, 10).⁸

New examples are harder to find in a later period, but the Seljuk invaders of Asia Minor in the 11th and 12th centuries constructed their great fortified caravanserais on the rectangular plan (fig. 11).⁹ It is more difficult to observe a continuity of rectangular planning in the West, but it seems likely that there was a continuous use of many of the Roman rectangular towns such as Soissons in France and Leon in Spain,¹⁰ and London and other towns in Britain. Much more of these Roman fortifications was in good order a thousand years ago, and certainly as late as the 11th century the Norman invaders of Britain found it useful to re-fortify Roman rectangular sites such as Colchester and Portchester (fig. 12).¹¹ The western use of rectangular planning may be seen *de novo* in the monastery plan for St. Gall, dating from the 9th century although no walls are included in the plan.¹² The Crusaders built forts on a rectangular plan at Chastel Rouge, Belvoir, and around Ascalon, and it becomes a current form in the fortresses and the new walled towns of 13th century France and England (fig. 13).¹³

Another part of the heritage left by the Romans lay in the frontier fortifications built by them. These amply demonstrate the fact that Roman military architects took a common sense view of their problem even if the solutions that they came up with were not always successful. Thus in Britain the linear fortifications of Hadrian and Antoninus Pius were constructed to close the relatively narrow necks of land in the north of the country, and in Europe the Limes Germanicus between the Rhine and the Danube.¹⁴ In Africa and on the Eastern frontier linear fortification was often impossible because of the mountainous terrain and the huge distances involved, and so the job was done by constructing a series of frontier forts, if possible along a natural barrier such as the river Euphrates.¹⁵ Under the later Empire the fort system was also employed in Britain to guard against the seaward invasions of the Saxons,¹⁶ and conversely the linear method was used in the eastern half of the Empire wherever it seemed useful. Thus the Isthmus of Corinth, the long wall of Thrace, the wall across the Crimean Isthmus, and the Abkhasian wall are examples of linear fortifications of the 5th and 6th centuries.¹⁷ This type of linear work does not seem to have been much used in the mediaeval West or by the Arabs, although mention must be made of great linear earthworks such as Offa's Dyke, and it may be that Derbend in the Caucasus is Arab, but the Byzantines certainly kept some of their linear defences in good repair.¹⁸

It must be remembered that if there existed this common heritage of Roman fortifications the forms of it differed in detail according to the age of the building and to its military function. The shape of earlier Roman fortifications resulted from Roman superiority over their enemies. Many of these enemies had lived in hill fortresses which the Romans largely abandoned in favour of the plains, where both military posts and cities could be built on a regular plan. In the early works they built simply and strongly. There was no need for vast ingenuity in their

defensive works because the enemy were fairly simple, if pugnacious, peoples, and such features as towers were put up at lengthy intervals, or even only at the gates and corners of a rectangular fortress, since the passive obstacle of the curtain wall was sufficient to keep out an enemy.

From at least the 3rd century A.D. the situation had changed, with the disastrous invasions of the Goths and Franks, and there was a considerable development of the active as opposed to the passive element in fortification. Towers become more frequent along the curtain wall, and they stand out boldly from the wall to make the enemy approach more difficult. This is exemplified in the walls that Aurelian built for Rome itself,¹⁹ or by contrasting the close set towers of 3rd century fortification in the north west of Europe or in Spain with earlier work in the same regions. Even mountain refuges were created of a comparable sort to those erected at a later date in the Byzantine period.²⁰ Diocletian's palace at Split has hexagonal and rectangular towers built out from the wall almost as if they were independent units (fig. 14),²¹ and the concept of close-set towers as found in the north-western fortifications of the 3rd century is paralleled in the walls of Salonica and Istanbul in the late 4th and early 5th centuries A.D.²² Thus already in the 3rd century it is apparent that considerable thought was being given once again to problems of fortification by military engineers who were producing new ideas or re-introducing old ones. This movement of change in the physical aspects of fortification fits into the context of administrative and economic changes which were transforming the life of the Empire at this period, and coincidentally or not it comes at exactly the time that the art of the Classical World begins to exhibit changes of a Byzantine or mediaeval character.

The common heritage was not therefore a simple and unified body of knowledge, nor was the treatment of this knowledge at all uniform, for in the west and in the north of the Empire from whence the Crusaders eventually would come, the development of ideas on fortification appears to halt, and at least in the north there was probably a reversion to the use of wood for some five hundred years from the 5th century onwards. Perhaps the most important reason for this lack of development is that all sophisticated Roman fortification was of masonry and rested on a developed lime technology. It does not yet seem at all clear how far the barbarian invaders of Europe were capable of using and understanding lime mortar since their natural building material was wood. The tradition of building in brick or stone with lime mortar was not of course lost in the Mediterranean world, and knowledge of it had spread north once more into Frankish and Germanic lands by the seventh or eighth century A.D., as can be seen in Carolingian buildings, or in an isolated church such as Brixworth in England. However it does not appear to have spread to new fortifications before the Norman period.²³ Many Roman fortifications stood firm over these centuries of neglect, and some town walls were no doubt in more or less continuous use in places where there was a continuity of urban life, but it was not until the close of the Dark Ages that any new features were added to them.²⁴

In the lands which they conquered the Arabs moved into cities and fortresses for the most part still maintained, and presenting both early and late Roman and contemporary Byzantine features. Thus they were presented with patterns to imitate, and in Spain in the West and Asia Minor and Syria in the east continuous warfare between Moslem and Christian gave stimulus for development.

The Eastern Roman or Byzantine Empire centred on Constantine's new city survived the fate of Rome for a thousand years by fighting off enemies both simple and sophisticated. For the eastern inheritors of Rome there is no disruption or discontinuity in the military inheritance but rather a continuous development. This is clearly demonstrated in the copying and modification of Classical military manuals, and in the writing of new works, with notable bursts of activity in the 6th, 9th and 10th centuries and new work appearing as late as the 12th century with

the Strategicon of Cecaumenos.²⁵ The art of fortification is in fact no different from the other arts of Rome in exhibiting changes of character as early as the third century A.D. which gradually transformed the Eastern Roman world into a new Byzantine and mediaeval civilisation.

Justinianic Fortification and the Tower Fortress and Citadel

The reconquest of North Africa in the 6th century left this part of the Empire faced with a nomad enemy of no great sophistication, and consequently the fortifications constructed for Justinian show no startling developments in the design of walls and towers.²⁶ But two features may be emphasized to exemplify a greater concentration on defense rather than on attack. *First*, the use of the bent gateway; the point of this device is that it makes an enemy turn a corner if he breaks down the entrance gate, and thereby lose the impetus of a straight rush. Conversely it is not well suited to attack since you cannot emerge with a chariot or cavalry charge at full gallop or march orderly columns of troops out of such a gateway with ease.²⁷ The *second* point is that although many of the fortresses are rectangular and in flattish country, some of them are sited on hills which provide natural defenses in the form of precipitous slopes, thereby making the fortification both easier and stronger.²⁸

This emphasis on defence is in fact typical of Justinianic works, and although we often tend to think of the Age of Justinian as a period of vast expansion and renewal, the military works of this Emperor are impressive by their emphasis on defensive design, and this was well understood by Procopius, who wrote of them. Of a town in the Armenian marches he writes: 'In Bizana however, nothing was done by this Emperor for the following reason. This town lies on level ground, and about it for a great distance stretch plains suitable for cavalry manoeuvres and there are many pools of standing water there. Consequently it is not only very open to the enemy's attack, but it is not healthy for the inhabitants. For these reasons he passed over this town and in another situation built a city bearing the Emperor's own name, a very noteworthy and altogether impregnable place, in the district called Tzumina, which is three miles removed

from Bizana, situated on very precipitous ground, and enjoying excellent air'.²⁹ Here then is early textual evidence of the removal of a city from the plains to a hilly site providing natural defences.

On the eastern frontiers the revival of Persian power under the Sassanian dynasty engendered an hostile and sophisticated neighbour to the Empire, and defensive works were built against the Persians that were of more sophistication than the forts of North Africa. The garrison town of Zenobia on the Euphrates provides one example of the kind of development taking place in Byzantine fortification against the Persians. Procopius describes the town, and his description can still be used as a Baedeker Guide because he went with Belisarius on his Syrian campaign and so he knew such places as Zenobia at first hand (fig. 15).³⁰ The plan of the town is roughly triangular in outline like many of the defensive sites favoured by the ancient Greeks. Syracuse, Salonica and Trebizond, are well known examples (figs. 16, 17). The base of the triangle runs along a sea or river front, and this is provided by the Euphrates in the case of Zenobia (figs. 18, 19). From the base two walls run uphill, preferably with a natural ravine to the outer side to help the defences, to a citadel on the summit of a hill. Such a site was often divided into three parts: a lower city, a middle city, and a citadel, as was the case at Zenobia, and similar tripartite divisions are to be seen at Salonica, Trebizond, Mistra, and elsewhere (fig. 20). If we take a broad view of the history of fortification it seems reasonable to suggest an obvious analogy or at least some ideological connection between lower city, middle city, and citadel, and the developed castle form of outer bailey, inner bailey, and keep. The idea of a citadel or acropolis as the last place of resistance in a fortification or town was common to Greek and earlier civilizations but it seems to have fallen out of general use with the Romans for whom the whole town or fortified site was enclosed by a circle of walls which they proposed to hold. Retreat into a citadel does not seem to have been a part of Roman military thinking until the decline of the Empire, and the re-discovery or the re-use of the idea of a citadel appears to fall to the military architects of Late Antiquity.

Procopius describes the citadel at Zenobia (fig. 18) as follows:

Furthermore a certain hill stood very close to the city on the side towards the west, from which it was possible for the barbarians, whenever they attacked the city, to shoot down with impunity upon the heads of the defenders, and even upon the heads of those who stood in the middle of the city. So the Emperor Justinian connected the fortifications with this hill on both sides and thus brought it inside Zenobia; and he escarped the whole hill throughout, so that no-one might climb it to work harm from there, and placed another fortification on its summit and thus made the city altogether inaccessible to those who wished to assault it.³⁰

The illustration shows clearly that at the base of the citadel walls there is a regular steep slope forming a glacis or talus not unlike the one that protects the inner bailey of Krac des Chevaliers (fig. 45). Zenobia therefore presents us with a developed 6th century glacis, but the idea of a glacis or talus is obviously much older and must derive ultimately from earthen ramparts, sometimes faced with stone. An early example in Anatolia is the walls of the Hittite capital at Boğazköy, topped by a wooden palisade or a stone wall.³¹

In the long curtain walls of Zenobia (fig. 19) the towers punctuate the walls at close intervals and they stand well out from them showing that the architect of Zenobia knew how necessary it was to indulge in cross fire against an attacking enemy. The city stands upon the confines of the Empire, and the Persians were formidable adversaries who must not be allowed to approach too close to the walls or towers. The main gates into the lower town of Zenobia (fig. 21) have straight carriage entrances but these are protected at length by their jutting towers which exposed an enemy approach to perilous fire.

In writing of another eastern frontier town, Constantina, Procopius states that

In all parts of the defences he inserted a new tower between each pair of towers, and consequently all the towers stood out from the circuit wall very close to one another. Also he added greatly to the height of the whole wall and of all the towers, and thus made the defences of the city impregnable to the enemy. And he also built covered approaches to the towers and made them three storeyed by adding courses of stone curved in the form of vaults; thus he made each one of them a pyrgo-castellum as it was called, and as it actually was (fig. 28). For they call forts Castella in the Latin tongue.³²

Procopius also notes Justinian's work on the defenses of Sergiopolis, now Resafa in the Syrian desert (figs. 22, 24, 25, 26). This is a rectangular city of the plains with its walls now half buried in the sands, but the walls and towers are still an impressive sight. The walls were of the galleried type with an arcade of arches and embrasures for defensive fire from within the wall itself as well as from the wall walk and battlements which crowned it.³³ The main gate is a carriage gate but with a sophisticated barbican courtyard and outer walls to defend it.

Where a simple sort of enemy was in question the Romans sometimes made their walls and towers without any loopholes or windows, and fought from the wall walk or from the tops of towers. But by the 5th century the Theodosian towers and walls of Constantinople have openings for giving covering fire and the principle of simultaneous fire power from the low outer wall, the higher main wall, and the highest point of the towers was clearly adopted (figs. 1, 1a: Part II). Together with this triple potential for offensive fire power the Constantinopolitan walls embody the defensive advantages that an enemy taking the outer wall was still subject to a withering fire from inner wall and towers, while if he took a section of the inner curtain he was still subject to fire from the towers.³⁴ T.E. Lawrence's verdict that 'Byzantine curtain towers are mysteriously inadequate'³⁵ seems hard to support in the light of the above examples unless the mystery lie in discovering how they were inadequate.

That the Byzantines attached great importance to towers and covering fire is once again clearly stressed by Procopius in his account of Justinian's work at Dara:

For he contracted the original apertures of the battlements by inserting stones and reduced them to very narrow slits, leaving only traces of them in the form of very tiny windows, and allowing them to open just enough for a hand to pass through so that arrows could be shot against assailants ... Then above these he added to the wall a height of about 30 feet ... and at the towers there were actually three levels for the men who defended the wall and repelled attacks upon it. For upon the middle of each tower he added a rounded structure upon which he placed additional battlements, thus making the wall three storeyed ... but one of the towers called the Tower of the Guard he pulled down at a favourable moment and rebuilt it so that it was safe.³⁶

Byzantine fortifications of the 6th century have some relevance to discussions about the origin and form of the keep or donjon. Toy defines the keep thus:

The keep is that focal point of a castle to which in time of siege the whole garrison retired when the outer works had fallen. It was, therefore, the strongest and most carefully fortified part of the defences. It generally had a well and contained all the offices, living and serving rooms necessary to sustain a long siege. As originally built it generally stood in line with the outer defences, so that while one side of it looked towards and commanded the operations in the bailey, the other side commanded the field and the approaches to the castle. The side open to the field also presented a line of escape.³⁷

This is a clear definition, and Toy goes on to discuss the shell keep, which in Europe he defines as originating from a line of masonry walls and towers built around the mound of a motte and bailey castle, superceding the original wooden palisade.³⁸ A shell keep is therefore an enclosed

area within another enclosed area and if to the word keep in Toy's definition we add citadel, and to castle we add town, it will be found that the same definition covers a much wider range of fortifications. Thus modified, we can state that the keep or citadel is the focal point of a castle or town to which in time of siege the whole garrison retired when the outer works had fallen. A final defensive point in the form of an inner walled strong point, a shell keep, or a tower keep, or a citadel is fundamental to the idea of fortification and it was well understood long before the age of Rome. If the Norman or Crusader keep is fitted into this wider context it is much easier to understand and less susceptible of special treatment as a peculiar phenomenon. The shell keep, or citadel, or inner bailey, or inner enceinte is well exemplified at Zenobia (figs. 15, 18), or Antioch. (figs. 27, 31) And at Krac des Chevaliers (figs. 32, 45), a similar ring of walls and towers performed the same function some six centuries later.

Toy's definition continued "As originally built the keep generally stood in line with the outer defences". He is not specific as to when the 'originally' refers, and a separate feature of fortification may perhaps be isolated here. This is the tower fortress in a curtain wall which was designed to stand on its own if the curtain wall was taken. The idea for such towers must date back to a period when better offensive methods had made the curtain wall increasingly vulnerable to attack, so that the type of tower with easy access into it fell with the wall.³⁹ The damage however was much less if the towers remained intact, and continuous cross fire and eventually counter offensives could be launched from them before an enemy climbing in over a lot of rubble had time to re-group himself and take the whole castle or town. Procopius was clearly referring to this type of tower at Constantina in the passage quoted above: "Thus he made each tower a *pyrgocastellum*, as it was called and as it actually was. For they call forts *castella* in the Latin tongue". His word *pyrgocastellum* means tower fortress and this is after all precisely the definition of a keep, except that keep defines a place of last resort for defence whereas the tower fortress of Procopius could be one of a number of points.⁴⁰

Another 6th century structure at Zenobia appears to be a Praetorium and it is built in the form of a tower fortress situated high on the north west wall of the town (figs. 18, 23). The name is derived from the *Castra Praetoria*, built for the Praetorian guard by Tiberius just outside the walls of Rome in the year 23 A.D. The word seems to change its meaning to become a general word for the residence of the commander of a garrison, or for the officers' quarters.⁴¹ The Zenobia example was immensely strong and comparable in size to some Crusader keeps.

Higher up the Euphrates, the towns of Sura and Dibsi Faraj in the Euphrates flood plain also had shell keeps or citadels. Sura, in the plain, has rectangular town walls and a rectangular citadel on the old Roman pattern, but Dibsi follows the irregular contours of the low hill on which it was built (fig. 38).⁴² Higher up again where the great river bends to the north the town of Narbalissos had the alternative feature of a tower fortress, keep, or praetorium — call it what you will, but it is a great tower, probably of 6th century date (figs. 33, 34).⁴³ From surviving engravings it seems clear that one at least of the curtain towers at Antioch was a tower fortress (fig. 27),⁴⁴ and there was certainly one at Nicaea, the siege of which was specifically described by William of Tyre.⁴⁵

The importance of the fortifications of Constantinople, Nicaea, and Antioch as an influence on the Crusaders has been noted by a number of writers but it would be interesting to have a detailed study of this subject. The actual siege of a town such as Nicaea, even though it was carried out under Byzantine tutelage, must have led those Crusaders who were interested in military engineering to make a careful study of its fortifications. This is even more true of Antioch which the Crusaders first besieged and conquered in 1098, and then held virtually until the end of the Crusading era when the city was retaken by Sultan Baibars and the Mamelukes

in 1268 (figs. 27, 31). The disposition of the fortifications of these and other sites in Syria and the Holy Land may have had a much greater impact and influence than discussions with Byzantine contemporaries or the precepts of ancient primers on fortification.

If we move up now to the Crusader period the same type of Great Tower is to be found on the east wall of the castle at Saône (figs. 35, 36, 37).⁴⁶ It is quite independent of the wall walk and no besieger taking the rest of the castle would have been safe until he had reduced this tower. William of Tyre mentions another Crusader fortification, the castle of Darum built by King Amalric and of this he writes that it was rectangular with towers at each corner, but one of these "was more massive and more strongly fortified than the rest."⁴⁷ This again must be a tower fortress or keep. This type became popular with the Turks who developed it into the latest and most impressive feature of mediaeval castle building. At Alanya on the south coast of Turkey the Seljuks built the Red Tower, a fortress in itself, not high up on the citadel hill, but down by the port to protect their naval dockyard (fig. 39).⁴⁸ At Rumeli Hisar, built by Mohammed the Conqueror as a prelude to the taking of Constantinople, there are three vast independent towers, one at each corner of the curtain walls, but no independent shell keep or citadel (figs. 40, 43).⁴⁹ At Anamur on the south coast of Turkey there is a fine tower fort at the opposite end of the castle to the citadel or shell keep (figs. 44, 46).⁵⁰ And at Salonica the White Tower at the eastern end of the sea wall is another massive independent tower-fortress.⁵¹ These last three fortifications have been variously labelled Byzantine, Crusader and Venetian, but are now known to be Turkish.

Returning now to the castle of Saône we can note that it has its Crusader tower-keep on the wall but it also has a rectangular citadel or shell keep of Byzantine date on the summit of a hill within the castle, and thus, like Antioch and Zenobia, it effectively exemplifies the difference between these two strong points: the one is in the form of an independent tower fortress and it may be on the outer wall or in the centre of the fortification. The other is a citadel or shell keep serving as a last point of defence, and it also may be on the outer wall or in the centre of a fortification. One or both of these features may appear in a fortification, and the strong place of last resort may be either a shell keep or citadel, as it usually is in larger works, or a tower fortress in a smaller work. Large Byzantine town fortifications tend to be provided with the shell keep or citadel as the strong place, but we have seen that this also appears in the most famous of the Crusader castles, Krac des Chevaliers, where the Hospitallers were in charge, and the strong place was needed not for a single Lord with his family and retainers but for a body of men who were all knights (figs. 32, 45). The tower fortress is by contrast suitable to the stronghold of a family castle, and many Byzantine and Crusader castles take this form.⁵²

If the appearance of the western mediaeval shell keep is viewed in the context of this wider discussion it becomes easier to understand, whereas a discussion of it limited to the context of Norman or Crusader castle building tends to blur the main point about the development. A part of the problem is resolved by a change of terminology. The term 'shell keep' immediately associates this type of fortification with the tower fortress or keep of a castle, and there is no reason why a ring of walls should develop either out of or into the idea or the fact of a tower structure inside a castle. Tower and wall are distinct architectural elements in the art of fortification. Inner bailey or citadel are clear terms for the shell keep and define it in a manner which rightly associate it with the final place of defence for a town.

Byzantine towns from the 6th century onwards were usually equipped with citadels and sometimes with tower keeps as well. In Mediaeval Western Europe the walled town with a citadel is substituted for the tower and bailey castle as soon as the process of settled life was far enough advanced to demand markets and towns. There is a fundamental change of function attached

to these two forms of fortification; the tower-keep with its chemise or shell keep is the appropriate place of final defence for a lord or king or general pushing into hostile country and establishing a settled stronghold or castle as a base of operations. The citadel is the place of last resort for the garrison of a town, and Conway or Caernarvon are more easily intelligible if referred to as citadels rather than castles (figs. 47, 48). When it is understood that the great Edwardian fortresses are not so much feudal castles but rather urban citadels, their forms are easier to comprehend. It is the need for a fortified town that explains the existence of these Edwardian citadels and not the need for a castle that explains the existence of the town. Between the Hellenistic walled city with a citadel such as Salonica or Athens or Corinth; the Byzantine walled city and citadel such as Zenobia, Ankara or Amasya; and the Frankish bastides or the Edwardian plantations there is a direct and logical comparison. The reasons for the existence of such towns built in different times and different places are the similar needs: these are for a fortified port, or for an inland market forming an emporium, or for a place to guard routes of communication; and for a fortified place in or on the borders of an hostile region.

The term shell keep is a cause of confusion, and in the interests of clarity it should be dropped. The curtain wall or chemise erected around a Norman motte, and other inner defensive walls are best referred to as inner bailey or inner ward or citadel.⁵³

On the question of the layout of fortifications and the use of concentric walls as a defence, Sir Charles Oman wrote:

The essential features of Byzantine military architecture were the erection of double and triple defences round the core of the fortress, and the careful provision of towers set at intervals in the 'curtain' of the walls. Both were new ideas to the Crusaders whose notion of a fortress was nothing more than a keep surrounded by a plain outer curtain not strengthened with towers.⁵⁴

This seems to have particularly angered T.E. Lawrence who exploded

To assert that the conception of a concentric castle had to be learned from Byzantium and imported into Europe just in time for the building of Château Gaillard is to fly in the face of all probability.⁵⁵

Lawrence was of course right but for the wrong reason in this particular example since Château Gaillard is not a truly concentric castle, and he was also right to point out that military builders must always have had enough sense to realise that if time, money, materials, and the nature of the site allowed of it, two or more walls were a better proposition than one wall (fig. 49). The Iron age hill forts of Britain, like Maiden Castle, are often concentric fortifications. In the Dark Ages the great circles of the Avar Ring in the Hungarian plain gave the Franks of the age of Charlemagne an opportunity to observe this type of plan. And it has recently been argued that the earliest Norman fortifications were concentric, without a keep.⁵⁶ East of the Mediterranean world the new Abbasid capital of Baghdad, 762–766 A.D., was a round city with double walls, and this type of concentric design in the east went back at least to Ecbatana, built by Dioces in the 9th century B.C.⁵⁷ Here then is another idea which is neither Frankish nor Byzantine in origin.

From this brief survey of some Justinianic source material and fortifications it is clear that by the sixth century Byzantine military architects were providing towers for flanking fire along the curtain walls; bent entrances occasionally but not always since there was often a need for large gates to a site, and these could be well defended by flanking towers and forecourts; citadels or shell keeps; tower fortresses or keeps; fore-walls and ditches; and curtain walls that were provided with firing loops within the thickness of them, as well as with provision for firing from merlons along the tops of walls.⁵⁸ They were also aware of the advantages of good natural

defences, and indeed if military commanders of any age and period had not been aware of the advantage of being on top of a slope rather than at the bottom of it their time as commanders would have been short lived.

T.E. Lawrence rightly used Procopius, though in a somewhat desultory fashion, as a source for Byzantine fortification, but he went on to write with apparently imperturbable ignorance

After Justinian Byzantine architecture stood almost still . . . No one has yet been able to distinguish later Byzantine repairs and additions amongst the original works of some Justinianic castle. The Greeks were so obsessed with the excellencies of his work, so bound by the precepts of Procopius, and of the author of the *Taktica* who followed him, that they made hardly any improvements.⁵⁹

By taking this view, Lawrence was able to ignore precisely that period of Byzantine history when the Greeks waged a war in some respects very similar to the wars which the Crusaders found themselves fighting only a century or two later. This was the three hundred years of struggle with the Arabs between c. 650 and 950 AD, in the course of which Byzantine social, political, and military life was transformed.⁶⁰

Byzantine Fortifications 650–1204

There are at the moment very few securely dated Byzantine fortifications because little work has been done in correlating observations on site with the information that Byzantine writers give about them. The present account is therefore only very partial in the mention of monuments, and tentative in conclusions about them. It will be seen below that a few fortifications are attributed to the Byzantines on grounds of masonry, or style, or historical probability. Some recent authors have used similar grounds for attributing the same fortifications to the Franks, Armenians, or Seljuks. Both sides of these attributions are therefore matters of opinion rather than fact, and so they must remain until archaeological research at the sites in question can give us more factual evidence about them.

CHOICE OF NATURAL SITE

We have seen that mention of a move from the plains to a more naturally defensible site occurs already in Procopius⁶¹ and that such moves had occurred as early as the 3rd century, but it was during the wars with the Arabs, tiding to and fro across Asia Minor, that the great cities of Antiquity situated in the plains and deltas fell to the Arabs, and with few exceptions they were never rebuilt as recognisably the same cities.⁶² Where an old city site remains unchanged it is usually a coastal site the position of which is dictated by a good harbour and a route inland. Examples of coastal towns which the Crusaders knew and which did not move were Corycus and Attaleia on the southern coast of Turkey, and Tripoli, Beirut, Tyre and Sidon on the Levant coast.

But where a town did move, it was often back to the same Hellenistic hill site above the valley

from which the Romans had removed it to build instead in the plains. The Hellenistic hill sites had been chosen for their natural security. The Byzantines moved back to them for security against Arab raids which came with disastrous regularity each season, and it is the existence of these castles and fortified hill cities which prevented the Arabs from colonising and conquering Asia Minor in like manner to their other territories. The castles might be imperial stations on lines of communication, or signal forts such as those which served the system beginning at the Cilician gates and forwarding early warning of Arab raids to Constantinople.⁶³ Or they might be the castles of landowners whom the state of unrest had forced from a peaceful Roman villa life into the fortified residence of a mediaeval Lord. Such fortifications are relatively small in scale and comparable in size to the later feudal castle of the West.⁶⁴ The fortified town sites were of course much larger. The new situation was graphically summarized by an Arab historian

possible! In the days of old cities were numerous in Rum (Byzantine Asia Minor), but now they have become few. Most of the districts are prosperous and pleasant, and have an extremely strong fortress on account of the raids, which the fighters of the Faith direct upon them. To each village appertains a castle where in times of flight they may take shelter.⁶⁵

anonymous! And on the Byzantine side this use of castle refuges is described in the *De Velitatione Bellica* of Leo the Deacon.

Thus, together with Late Antique fortifications, it is these Byzantine works that the Crusaders will have seen as live and working systems of defense, and they present three common choices of natural site, and a considerable variety in methods of fortifying them. Whether or not the site was re-used from an earlier period, it was required to be in a useful position with regard to lines of communication, or for trade, industry, and agricultural purposes, and to have natural defences and access to a water supply. The first type of natural site that was often chosen was the spur or shoulder jutting out from a range of hills since this provided natural defences on three sides, and left only the narrow neck adjoining the main range as a weak natural point that could be strengthened by ditching. If a river ran at the foot of one side, this was so much the better since a covered way could be built for access to water.⁶⁶ Among Byzantine spur sites are Kastamonu, Amasya, Niksar, Tokat, Koyulhisar (fig. 50), Seleucia, Antioch, Saône and Sheizar. There are numerous parallels to such spur sites among Crusader fortifications in the Levant and in the medieval West.

The second obvious natural site is the isolated crag or hilltop. Among Byzantine examples are Cotyaeum (Kütahya), Ankara, Afyonkarahisar, Şebinkarahisar, Kalecik north of Ankara (fig. 51), and St. Hilarion in Cyprus. These are on natural sites but others like Amorium, Claudiopolis, Iconium or Melitene use the ready made motte formed by a prehistoric mound. It is perhaps worth reflecting on the similarity of motte and prehistoric mound, although this may be regarded as coincidental. In the West, hilltops were chosen for extensive fortification at least as early as the Iron Age, and there are of course many parallel examples of Crusader and Western medieval hilltop sites. A third type of natural defensive site is the triangular form mentioned above. This is sometimes formed from the spur of a hill, as at Antioch, Salonica, Amasya and Mistra, and sometimes the apex rises to an independent hilltop as at Zenobia. Apart from the shared examples of Antioch and Tripoli, this is not a common Crusader type of site because it usually necessitated enclosing a large area, and it was therefore suited to the Byzantines who wanted a fortified refuge or town, but less suited to the Crusaders who were generally happy to exclude a population upon whose loyalties they were unable to depend. A fourth type is the peninsular site on the sea or at a river estuary. Byzantine examples, nearly all reused from the age of Greek colonial expansion are Sinope, Cerasus, Pontic Heraclea and Coracesium (Alanya) (figs. 39, 52, 53). Crusader examples are Sidon, Tyre, Tripoli and Acre, all reused

from earlier periods, and Athlit. From these examples it is clear that the use of various natural features offering an advantage for defensive fortification was an idea translated into practice at least as early as the Iron Age in the West and the Hellenistic age in the East, and that if the Romans had no great need to develop this form, the Byzantines did so consistently from the 6th century onwards. The Franks of Western Europe certainly used natural defensive sites in the Hispano-Arab wars, but in northern Europe before the 12th century the only acknowledgment of this form seems to be the artificial creation of the Norman motte. In the Crusading states natural defences were regularly used in the siting of fortifications in ways paralleled in earlier Byzantine examples. In France at Château Gaillard we have the first prominent and sophisticated example of a natural defensive site for a castle.⁶⁷

EXAMPLES OF BYZANTINE FORTIFICATIONS

From the natural location we can now proceed to look at the way in which Byzantine military engineers treated their sites. There is an obvious difference here between sites which never moved their location and sites which were moved. The plans of fortification of great city sites such as Constantinople, Salonica, Nicaea, or Antioch were already laid out by the 6th century A.D. or earlier and these were usually repaired and strengthened where necessary, with little change in the basic design. Some cities did not move their location but contracted drastically in size. One example of a much contracted acropolis town is Athens,⁶⁸ and for a contracted harbour town on flat land there is the city of Side on the south coast of Asia Minor.⁶⁹

AMASYA (figs. 54–62)

Amasya is an example of a town which did not move its site but the fortifications of which vastly expanded in the middle Byzantine period. Amaseia/Amasya, lies on the river Iris/Yeşil Irmak in northern Turkey. It was the capital city of Mithridates, and Mithridatic masonry is still to be seen in the lower walls and in the citadel. The town clusters along the river bank at a point where a precipitous rock dominates the river as it enters a defile. The rock stands some 850 feet above the town, and it is crowned by a citadel. Possibly at all periods the town spread across the river, as it does now, to the more spacious and level southern banks, but the Byzantine wall ran along the north bank of the river under the citadel rock, where banded masonry of brick and stone courses can still be seen in places. On the northern side the citadel rock can be seen to be a spur. The natural defenses were not impressive on this side and so a system of more or less concentric walling was adopted. The towers and walls are of varying periods and a thorough survey and excavation would be necessary to sort out the site, but much of the layout is certainly Byzantine and there are a number of features that are of interest. The principal gateway system of the upper fortress was approached through a first gate in the forewall, and then along the walk between the forewall and the main wall which ran in the shadow of the main wall so that any attacker could be constantly bombarded. The main second gate gave access to a hall adjoining a protruding wall tower, and the exit from it was at right angles to the entrance. If an enemy stormed the main second gate there was a long U turn to negotiate the third gate (fig. 60) before he gained access to the upper bailey. He was then still dominated by the concentric walls of the citadel itself, which rise in a confusion of walls and towers in at least three levels, dictated by the rock on which they are built. Like Château Gaillard this is not strictly a concentric castle since the rock falls away into precipices on the south and west side where there is no room for walls. It is only on the northern and eastern sides that a concentric plan can be seen with the walls overtopping each other so that fire could always be directed both over the wall below, and on to it if it was taken.

One citadel tower at Amasya which is certainly Byzantine brings us to the second feature of interest, the water tower (fig. 57). The tower seems to have become insecure at some early date, perhaps as a result of the earthquake mentioned by Procopius⁷⁰ and the new facing of ashlar blocks was built with a distinct batter. The ashlar courses are of a regular height but the blocks are irregular in length and width, laid with a preference for alternating stretchers and headers in the manner of the earlier Hellenistic masonry (fig. 56). There are thin mortar layers at the joins and the core is of mortared rubble well tamped down. The water was reached by a remarkable piece of tunnelling rather like a London underground escalator tunnel cut down into the solid rock (fig. 58). It is now blocked but must have gone down about 800 feet through the rock to reach water at river level. These water tunnels, of which there are two or more at Amasya, and five at Şebinkarahisar (see below), are typical of Mithridatic and other Hellenistic castles on rocky hill sites.

In the arid climate of Anatolia a castle on a hill top was not viable without water, and lack of space often prevented the construction of cisterns for the collection of sufficient rainwater. To the Byzantines can only be credited the sense to re-use these remarkable pieces of engineering, and in this citadel the pitched brickwork vaulting at the mouth of the tunnel is certainly Byzantine.⁷¹

A third feature is the variety of towers around the lower edge of the citadel, some of which are rectangular, some pentagonal with a prow shape, and some round. The loopholes appear to be of two standard types, the narrow slit or the rectangular opening with jambs and lintel of single ashlar blocks, but in a later period they are made with no change in masonry at the jambs, and the lintels are of wood. The upper storeys have for the most part fallen away so that there is now little evidence for the wall walk, merlons, and machicolation, if any. A section of the lower western wall of the town has in the upper story of a rounded projection three single light windows, each with a slightly pointed arch. Some towers are open at the gorge while others, including the circular ones have a sharp batter and may well have had masonry domes. There are no dates for the various pieces of masonry but periods for them may be suggested as follows:

1. MITHRIDATIC

Isodomic headers and stretchers (fig. 56)

2. LATE ROMAN, 2ND-4TH CENTURY

Pseudo-isodomic ashlar, some of it re-used (fig. 56)

3. LATE ANTIQUE, 4th-6TH CENTURY

Banded brick and small ashlar coursing of good quality as in the river wall opposite the great mosque

4. BYZANTINE, 600 TO 1100 A.D.

(a) Pseudo-isodomic ashlar sometimes with re-used stone, citadel water tower and round towers (fig. 61)

(b) Banded brick and stone coursing re-using broken brick and random coursed stone (fig. 62)

(c) Uncut stone laid in roughly regular courses with the flat face of the stones outwards, evened up with small stones and a heavy surface rendering of lime. Reinforcing at regular vertical intervals with stringers and tie beams in a pattern which resembles on plan a railway line with sleepers as headers and the lines as stringers. The stringers are wooden beams that are laid horizontally within the wall and parallel to the wall surfaces. Tie beams are those that are laid horizontally within the wall but at right angles to the stringers and to the wall surfaces. This will hereafter be referred to as cribwork (figs. 61, 93)

(d) Uncut stone laid in roughly regular courses with the flat face of the stone outwards, and evened up with small stones and a heavy surface rendering of lime (fig. 61). No timber reinforcement

These four types of Byzantine masonry may at first seem an excessive number but the period is here taken to cover the 500 years from c. 600 to 1100 and over such a time span it is not unreasonable. Types 4 (c) and (d) may be subdivided into several builds at Amasya, and may include Seljuk and Ottoman work, but this does not necessarily invalidate the main classification.

For the next examples of Byzantine fortification we may take briefly some towns which were either moved completely, or which were at least moved back up to the original hill slopes from which the Romans had brought them down. Among this type of site are Tokat, Niksar, Şebinkarahisar, Kütahya, and Afyonkarahisar. These examples have no particular significance but were chosen because the writer has personal knowledge of them.⁷²

TOKAT (figs. 63-68) *Dokheia?*

Tokat, the Byzantine Dazimon, is a town on the upper reaches of the River Iris. The Byzantine site (fig. 63) takes the place of Roman Comana Pontica, which was several miles upstream in the river valley. Dazimon was important in the Byzantine period as one of the *aplekta* or gathering points which the Emperors used for assembling an army in Asia Minor when they went on campaign in the East.⁷³ Such a site needed a fertile area providing the fodder for horses and as much food as possible for the men, and this requirement is still to be seen as satisfied by the great and fertile plain of Dazimonitis. But an *aplekton* also required a strong point for safe keeping of the monies needed for paying and feeding the army, and for the Emperor's residence. Apart from this specialised imperial and military use, Dazimon was a trading emporium on important commercial routes.⁷⁴ Comana Pontica was obviously not thought defensible enough since it was in the river plain, and the site was moved back to the old Mithridatic castle of Tokat, with a tunnel water supply similar to that of Amasya for its rocky citadel. There is now no trace of Mithridatic masonry *in situ* but the Hellenistic period is attested by the tunnel cistern and two rock cut tombs of typically Hellenistic appearance. The forms of the fortification are difficult to determine with accuracy since it is now very ruinous, but it can be seen that there was an upper fortification of the twin peaks and a bailey lower down on the west side with the remains of barrack buildings, possibly of Seljuk or Ottoman date. There is a considerable re-use of classical masonry in the first period of Byzantine walling which may date from about the 9th century (fig. 64). It seems unlikely to be earlier since Procopius has no reference to Dazimon, and his one reference to Comana Pontica suggests that the old site was still in existence.⁷⁵

This first Byzantine walling is faced with long ashlar stones used in irregular alternation as headers and stretchers. The facing conceals the fact that the walls are bonded in horizontal courses with stringers and tie beams (fig. 65) in a cribwork pattern (fig. 93).⁷⁶ To this period may belong the ashlar face of the cistern tower (fig. 66) now much ruined and partly encased in later random coursed masonry. A third type at the base of a wall on the eastern side of the citadel shows a brick seating followed by random coursed stone and then a row of tie beams set as a complete course and separated one from another only by lime mortar (fig. 68).

A fourth type of masonry on the west side consists of more or less regular courses of stones very roughly cut to shape, with smaller stones filling the interstices, and this also has a timber cribwork frame. The holes where the tie beams have rotted away can be seen in fig. 67 at regular vertical intervals.

NIKSAR (figs. 69-74)

In the Lykos valley the Romans moved the Mithridatic town of Neocaesarea from its site on the spur of a hill a few hundred feet above the river down into the valley (fig. 69). The Byzantines moved it back to the Mithridatic site which became the citadel of a walled town gathering around the skirts of the spur. After its capture by them the city became the capital of the Danişmend dynasty and it must have been somewhere in the citadel that Bohémond was kept prisoner. Some of the masonry must be of the Danişmend period, but there are types of masonry closely paralleled in other Byzantine sites which we can fairly certainly regard as Byzantine. On the northeastern side where the spur is joined to the main ridge of hills a ditch was needed. The trace of the ditch and the outer citadel wall can be seen in the general view (fig. 69) with the town wall stretching down northeastwards into the valley. In addition there was almost certainly a second and lower fore-wall. The ditch is now largely filled in, and the great citadel wall beyond has been robbed of its ashlar facing, but one or two blocks remain, and the setting bed reveals the regular pattern of the ashlar headers and stretchers (fig. 70). Some of these were re-used classical stones as can be seen at the gateway where there is a drafted block. There appeared to be no timber bonding in this wall but fig. 71 shows traces of horizontal bonding courses through the thickness of the rubble core at intervals. The cross wall of the second or inner citadel is another massive work with roughly regular courses of uncut blocks with the flat face outwards (fig. 72). The regular rows of holes for tie beams suggests horizontal cribwork while the projecting rectangular bastion (to the right in fig. 73) only has these at low level. It will be seen that the two builds, although probably contemporaneous, are structurally independent. Niksar appears to follow Philo's advice about structural separation so that less harm was done by mining.⁷⁷ Another type of walling has indications of a cribwork frame in the repetitive courses of tie beams at intervals (fig. 71), and the facing here is of rough stone set in irregular herring bone pattern. The town walls (fig. 74) have rounded, rectangular and prow shaped bastions of rough build with random coursed masonry and ashlar quoins at the angles. It will be argued below that the prow shaped tower may be regarded as a hall mark of Byzantine building and we shall see that it recurs at numbers of sites.

ŞEBINKARAHISAR⁷⁸ (figs. 75-77)

The town and citadel of Coloneia/Şebinkarahisar were the capital of a Theme in the Byzantine period, and in a land of impressive castle building this is yet one of the most dramatic sites of Asia Minor (fig. 75). Earlier on it had been an important Mithridatic stronghold and there are five tunnel cisterns cut downwards into the rock, but all are now blocked up. The Romans appear to have abandoned the Mithridatic site in favour of Pompey's new foundation of Nicopolis about 20 km to the south on the edges of the fertile valley of Suşehri. The old citadel rock of Coloneia was re-occupied at least as early as the 6th century when Procopius records that it was re-fortified by Justinian.⁷⁹ The now blocked gate into the outer bailey on the rock may represent a surviving piece of this 6th century work (fig. 76). The ashlar frame of the present gate is clearly Turkish work, but the walls and gate towers around it are almost certainly Byzantine (fig. 77). The greater part of the circuit wall is on top of precipitous rock faces and could not be easily assailed except by stone throwing machines which would have been so far distant as to cause no grave danger. The engineer responsible for the fortification realised this fact and his wall is of thin random coursed masonry which served simply as cover for the defenders. Some stretches of the wall are strengthened with a cribwork frame.

KÜTAHYA (fig. 78)⁸⁰ (figs. 78-80)

A town more nearly on routes used by Crusaders was Cotyaeum. The Roman town had been in the wide river plain, but in the Byzantine period it was moved uphill with a new citadel built on a nearby hilltop, and a walled town around one flank (fig. 79).

The town is centred near rich clay deposits which still serve the famous potteries, and it is therefore not surprising to find brick as a commonly used building material. The citadel walls also have re-used classical masonry in them (fig. 79). On one flank of the hill are a series of closely set round towers leaving little space for the wall in between them. These towers are undated but the regular alternation of bands of brick with regular coursed stonework suggests an early date during the Arab wars, perhaps in the 8th or 9th centuries. The towers are built on plinths (fig. 79) and perhaps the nearest comparison to these walls in their powerful effect are the 13th century A.D. walls of Angers in France. Internally the towers were roofed by domes made in pitched brickwork (fig. 80). The rectangular towers, which may be later, are of regular coursed ashlar with re-used classical blocks at the base and a contemporary or slightly later curtain wall is of random coursed masonry.

AFYONKARAHISAR⁸¹

To the south of Ankara lies another hilltop fortification which some of the Crusaders will have seen. This was Akroenos, now Afyonkarahisar (fig. 81). The town replaced Roman Prymnessos, and is first recorded in the Arab wars in 740 A.D. The reason for the move is clear from the general view of the great lump of trachyte which rises some 900 feet above the plain. Water for the acropolis citadel was in this case stored in cisterns supplied by rain water. The Byzantine use, if not the origin of these rock cut cisterns is proved by the crosses carved in the side wall of one of them. The masonry of the citadel has generally been considered Seljuk because of the inscription over the gate mentioning the Sultan Alaeddin I Keykubad, but the utilitarian appearance of it suggests a Byzantine date (fig. 82). The walls are built of random coursed masonry brought up to a smooth surface with a heavy rendering of lime mortar. They are bonded at intervals with horizontal stringers and tie beams laid in the cribwork system (fig. 93).

THE SOUTH COAST

On the south coast of Turkey several castles have recently been included in surveys of Crusader castles and these must be mentioned here. The great castle of Anemurium/Anamur, has been mentioned above in connection with its tower keep by the main gate, and it is almost certainly all of Turkish build. The small castle of Zephyrion/Ovacık Burju, must be among the earliest of artillery fortifications, and of the same date as the north curtain at Anamur. Both castles have gun ports in the base of the walls but otherwise no change in design from earlier castle building can be observed (fig. 44). Ovacık is included here because it is one of the few castles seen by the writer in Asia Minor to have false heads in stone along the tops of the battlements as at Caernarvon and Conway castles in Wales.⁸² The important castle of Seleucia, now Silifke,⁸³ is documented as having been re-fortified by the Byzantines at the same time as Antalya and Corycus.⁸⁴ There are certainly three building periods and it is not at all clear what build belonged to whom, but an analysis of it would need a separate paper.

CORYCUS⁸⁵ (figs. 83-85)

There are a number of points of interest in the Cilician port of Corycus. The town first appears in the Hellenistic period and there is nothing to suggest that the site of it was ever

moved. The ruins of the city cover quite a wide area to the north east of the walls but the rectangular walled area is small. The walled area may have served as a late Roman citadel to the town, which functioned as a military and naval headquarters, and it is possible that it is Roman or even earlier in origin since the northeast tower of the outer wall has a distinctly Hellenistic appearance. Procopius has no mention of a Justinianic rebuild, but the inner wall on the west side has the remains of a round arched gate with shallow moulded voussoirs which appear to be of early Byzantine date and this is confirmed by a cross carved over the centre of the arch. The town is often loosely included under Crusader sites since it was held by the Armenians and later by the Lusignans of Cyprus. The documentary evidence for a Byzantine date has been ignored but it is strong and fits with the style of fortification and buildings. The town was one of the centres of the naval Theme which appears in the 7th century. It is also recorded that the Grand Duke of the Fleet reconstructed the fortifications of Corycus, Seleucia, and Attaleia in the early 12th century.⁸⁶ There seems to be no evidence for Armenian or Crusader possession of Corycus before the late 12th–13th century and little or no reason to attribute the style of fortification to them, as will be seen below. In plan the main point of note is that this is a concentric fortress with a narrow space between inner and outer walls, and with the inner wall sufficiently high to fire down upon or over the top of the outer curtain. Protecting the outer curtain was a wet moat which was completed on the eastern side, separating citadel from city, by an impressive ditch cut into the rock. The towers are round, rectangular, and pentagonal prow shaped, and on the inner eastern curtain are ruins of a larger structure which might have been a Praetorium or Governor's residence, or officers mess, or a tower fortress.⁸⁷ The masonry is of more than one period. The first, apparently Hellenistic, is represented by regular coursed ashlar using fairly large blocks. The second is late Roman or early Byzantine and consists of ashlar of smaller blocks. A capital used as a corbel in the south east tower is of late Corinthian type and might be of early 5th century Theodosian date. A third type of ashlar is characterised by the use of quantities of re-used classical blocks including columns used as headers and small ashlar in irregular sized blocks (fig. 85). And a fourth type of masonry is of small roughly cut stones laid in fairly regular courses, with larger stones used as quoins (fig. 85). The only evidence for Crusader or Armenian work lies in the rib vault of the south east tower, springing from the Corinthian capital mentioned above. The writer had no opportunity to survey the island castle which may well reveal more Crusader and Armenian work.⁸⁸

The major church in the interior at the northeast corner is a basilica. The basilica is built of regular courses of small ashlar facing blocks with a mortared rubble core. It was repaired at least once, probably due to earthquake damage, and where repair masonry has fallen away, one of the original pilaster capitals can be seen *in situ* and the style of carving suggests a 5th or 6th century date. The repair masonry is faced with less well cut blocks laid in regular courses, and may be associated with the re-fortification of the town in the late 11th or early 12th centuries.

A tentative classification for Corycus might date the plan of the concentric castle to the 5th or 6th centuries A.D., possibly in response to the Persian threat; a second period of re-fortification to include the prow shaped towers may be a response to the Arab threat and might be 9th century. It may be noted in passing that another important Byzantine naval base on the south coast at Attaleia has some pentagonal shaped towers along the curtain wall of the town which may also date from this period. A third period might include the rough cut masonry of small blocks, possibly representing repairs mentioned by Anna Comnena.

Eastwards of Corycus rough Cilicia gradually gives way to the plain and the Taurus mountains recede from the sea. The fertile plain was much fought over and coveted by the Byzantines and the Arabs, and afterwards by the Arabs, the Armenians, and the Franks. It constitutes the bord-

er at which the Byzantines held back permanent Arab settlement, and wherever there is an eminence a fortification is to be expected, and often found. Some of the Cilician castles have been surveyed and published⁸⁹ and at the vital point where the road bends southwards out of Cilicia and into Syria the castle of Toprakkale, has recently been added to the Crusader and Armenian list.⁹⁰

TOPRAKKALE (figs. 86–89)

The Byzantine name of the site has not been identified but geography, politics and strategy demand a castle at this site which guards the defile of the Syro-Cilician gates. Strabo names a frontier town, Pylae, which may be at this site, and Pliny called this the *Portae Ciliciae*.⁹¹ Toprakkale is here suggested to be the castle of the Black Mountain mentioned by Anna Comnena among the places figuring in the treaty between Alexius and Bohémond.⁹² The castle is included here in the Byzantine list for two positive reasons. First is the fact that it has examples of pentagonal prow shaped towers along its curtain wall (fig. 87). Second are the styles of masonry. One type consists of roughly squared dark blocks of medium size set in regular courses and bonded irregularly with a horizontal string course of limestone. Another type which may well be of the same period is of random coursed masonry evened up to a smooth outer surface with a heavy rendering of lime and pebble dash (fig. 88). The roofing of the undercrofts that survive is formed of barrel vaults of mortared rubble with ashlar ribs at intervals to strengthen them (fig. 89). The loopholes, of which a fine series survive along the eastern side, are faced with ashlar, and some have arches while others have only a flat lintel, and there is evidence of some repair to them (fig. 90). In design the eastern undercroft with its fighting platform above, is very similar to that at the nearby Tumlu castle⁹³ and the Tumlu embrasures are arched with brick which is a normal Byzantine building material but unusual in Armenian or Crusader building. There appear to be no positive features in the build of this castle that warrant an attribution to the Arabs, Armenians or Crusaders, and nothing to suggest that they did more than occupy and repair it. The great internal walled area of the shell keep or citadel is more typically Byzantine than it is Armenian or Crusader since it is better suited for the housing of the larger numbers typical of a Byzantine army. The masonry resembles that period of the neighbouring Anazarbus castle walling attributed to the Byzantine period,⁹⁴ and also the earlier periods of masonry at another neighbouring castle, Gökvelioğlu.⁹⁵ Furthermore it has a row of prow shaped pentagonal towers in the lower curtain wall. From this brief survey of a few fortifications that may be attributed to the Byzantine period some tentative observations of a general nature may be made.

Byzantine Masonry and Construction

THE USE OF LIME MORTAR

The change from an architecture based on wood, mud brick, or carved stone to an architecture based on lime mortar presents a confused story, which has yet to be written; but for the purpose of understanding fortifications some general points about constructional techniques must be made.⁹⁶ Most if not all Hellenistic fortifications relied on the strength of large ashlar stones often set on the casemate or *emplekton* system, with ashlar stretchers and headers, and the spaces between them filled with rubble and earth (fig. 91).⁹⁷ By the time that the Romans were commonly erecting fortifications from the first century onwards the strength of lime mortar was well understood and it was in general use throughout their Empire. Lime mortar begins its usefulness as an adhesive force helping to bind an ashlar or brick facing to a core of lime mortar and stone rubble (fig. 92). The mortared rubble core was still thought of in the early days as an inert fill, while the strength lay in the quality of the stone or brick facing. The reversal of this attitude, with attention centring on the structural quality of the core of lime mortar and rubble was a slow and uneven process resting upon trial and experiment, but the architectural results of this revolution were startling. They have been outlined by J.H. Middleton and later by Ward Perkins in the case of Roman architecture, where by the second century if not earlier the great imperial and public buildings of Rome owed their increasing variety of forms to the quality of their lime mortar.⁹⁸ The very greatness of these buildings in Rome is not to be denied but it has led to an exaggerated view of the properties of the lime mortar of Rome and its environs, termed "lime concrete" by Ward Perkins, in contrast to other lime mortars in use throughout the Empire, for which he used the apt but somewhat pejorative "mortared rubble".⁹⁹

The strength of a lime mortar varies in response to four important conditions: The *first* is the quality of the lime, which itself depends upon the type of chalk or limestone burned to make either a hydraulic or a non-hydraulic quicklime, and the length of time that it is kept in slaking; the *second* is to make a correct quantitative addition of aggregate for the particular job in hand; the *third* factor is the nature of the aggregate, which may constitute a more or less inert fill, or it may have the property of increasing the adhesive power of the lime; the *fourth* condition is the correct application of the plaster or mortar.¹⁰⁰

The Romans inherited, improved upon, and regulated the making and the use of lime, and they knew by experience about the better qualities of limestone and how to treat them.¹⁰¹ They also knew from experience two things about aggregates. The first has been fully chronicled by Ward Perkins, and it concerns the use of the volcanic sand pozzuolana from the district of Pozzuoli, south of Rome. This has the property of accelerating the carbonation process and at the same time making the chemical conversion into calcium carbonate more thorough, even allowing it to proceed under water. The use of pozzuolana was largely confined to Rome and the country south of it, so that this is a localised development. But the Romans also knew that pounded up brick or earthenware produced the same hard waterproof mortar as did a pozzuolana aggregate. There is no documentary evidence for this statement later than Vitruvius,¹⁰² but there is the acknowledged fact that from end to end of the Empire lime mortars with an aggregate of pounded brick or earthenware as well as sand were used for the lining of cisterns, for wall plasters, and for buildings, including fortifications. The use of a pounded brick aggregate is common to the East and West up to about the 5th century. In the Eastern Empire it continues in use in urban centres or wherever old bricks were easily available, although it is much less commonly seen in the eastern provinces in the Byzantine period, presumably because bricks were less easily obtainable. The Ottoman Turks inherited this Roman and Byzantine technology and they used the same brick aggregate in many of their buildings.

It would be interesting to know if a brick aggregate continued in use anywhere in the Mediaeval West. In England it is said to appear in the 13th century,¹⁰³ and it appears in the 14th century among other aggregates in the accounts for building one of the riverside turrets of the Tower of London.¹⁰⁴ The keep at Pembroke, which will be mentioned again below, has in the mortar a liberal admixture of chips of red stone which may indicate that the master mason knew of the value of powdered brick and hoped that the same coloured stone would do the same job.

The essential chemical element for making a hydraulic lime mortar or concrete is hydrated aluminium silicate. This is present in pozzuolana and in fired clay, but it is also present in a variety of other argillaceous substances in nature, in a wide variety of regions. In addition to pozzuolana and pounded earthenware, the one localised in usage around Rome, and the other universally used throughout the Empire, there were, therefore, the fortuitous use of local aggregates equally capable of producing a hard mortar deserving of the name lime concrete. In Greece the earth of Santorin was known, in Germany the trass of the Rhine Valley, and clays in Roumania and the Crimea all have the necessary chemical properties for strengthening lime mortar. None have been named in Anatolia but a geological survey would almost certainly locate them, and the clays of the Iznik and Kütağya regions are likely to head the list.¹⁰⁵ The advance in lime technology was not therefore confined to Rome alone, and even without the addition of pozzuolana or pounded earthenware, mortars of great strength were produced if the right lime and the right admixtures were used.¹⁰⁶

The results of this advance in confidence in the use of lime mortar eventually became apparent in Byzantine military engineering. Up to the 6th century, a good ashlar facing for a wall, or a wall of ashlar banded with courses of brick both on the face and right through the core were

still the norm in fortifications.¹⁰⁷ Thereafter a new need arose when the Arab raids in Asia Minor created a fluid situation which demanded a quick response by the provision of fortified refuges. A satisfactory method of building these was found in the new reliance on the strength of lime mortar mixed with rubble, and the finished and beautiful wall facing of ashlar and brick were abandoned so that half the labour of building a wall was cut out. What is left in Byzantine fortification is in effect the mortared rubble or *Opus Caementicium* core, faced with any available larger water worn or flattish stones on the wall surfaces (fig. 94). In these new Byzantine walls there is no essential difference between core and facing, whereas in earlier building methods the rubble core and the ashlar facing make up two distinctive elements in the wall. This is almost certainly the kind of work which Vitruvius had described as *Opus Incertum*. He seems to imply that this sort of walling was a Greek invention; he remarks that it is stronger than *Opus Reticulatum* and "therefore the walling of the Greeks is not to be made light of".¹⁰⁸ Byzantine military builders were in fact re-discovering rather than discovering the usefulness of an old technique which had gone out of fashion. The unevenness of the wall surface in this type of masonry was remedied by a filling of smaller stones, and a heavy rendering of lime plaster was added to bring the work up to a durable and smooth external finish. Gypsum was used in the same way as lime in regions such as Cyprus where it was freely available and Theophrastus mentions its use for building purposes, but he confuses lime and gypsum.¹⁰⁹ Philo recommends gypsum in fortifications, but lime is certainly the more commonly found in Byzantine works.¹¹⁰

If good workable stone was available and the money, time and skills for the work were forthcoming, then Byzantine fortifications can still show neat workmanship, but it was clear to Byzantine military engineers that skilled stone carving was no longer necessary for an efficient fortification. For once in history, military engineers were in advance of civil master masons in the putting into general use of an old but little used and more economical way of building fast, and the success of it may be measured by its widespread use in Byzantine fortification. There are dozens of castles up and down Anatolia that are built in this technique, and plenty of examples in Greece and in the Balkans. Most of them have been ignored by travellers and archaeologists because although the fortifications satisfy two of Sir Henry Wotton's conditions for good architecture: commodity and firmness, it can hardly be said that they succeed in the essential third ingredient of delight.¹¹¹ There is some evidence to suggest that a parallel development of the mortared rubble wall happened in the West, and that this technique of military building may date back to the 4th century. Thus the Roman headquarters building at York (recently excavated under the Cathedral tower) was rebuilt with mortared rubble in the 4th century and it was designed to have a lime plaster finish without ashlar. It is impossible at the moment to say whether knowledge of the same building method survived through the Dark Ages or not. The fortifications at Cadbury consisted of rammed earth strengthened by cribwork, with a timber palisade on top of the earth wall, and probably the same system was used for Offa's Dyke.¹¹² These suggest the loss of the lime mortared rubble tradition, but it does re-appear in the late Saxon period in churches such as Earls Barton. The likelihood is that the technique survived in the more Romanised lands of southern France, Italy, and Spain, but that timber became the main building material in the well forested lands of the northern barbarians. Norman keeps, on the other hand, were frequently built in this technique of mortared rubble, with parts of the facing brought up to a smooth finish with a heavy rendering of lime. The White Tower of London is one example, to judge by its name, and Hubert de Burgh's White Castle still has both the name and the surviving masonry with lime plaster rendering. Presumably the white lime rendering survived longer or was kept in good repair on these two castles to become so striking a feature that they were so named, but the system of building was the same in many early castles. Kidwelly and the great keep of Pembroke are examples in South Wales, and later among the

Edwardian Castles Harlech, Conway, Rhuddlan and Denbigh were all finished in this way, as was the little keep at Skenfrith. For a military engineer it was the obvious building technique to use where you wanted to build fast in potentially hostile country, and the local stone was hard and suitable for fortification but intractable for shaping into ashlar. The final outer surface sometimes appears to be of a fine lime slurry which might equally well be referred to as a whitewash, but unlike whitewash it fulfilled in this method of building a functional purpose.¹¹³ And sometimes this final surface contains a lot of small stones or pebbles and it resembles modern pebble dash except that lime was used instead of cement. Where some ashlar could be found, a compromise technique was adopted whereby the lower courses of a wall or tower, the quoins, jambs and voussoirs, and in the case of Norman keeps the vertical pilaster bands or buttresses, were faced in ashlar, while the rest of the surfaces were rough and pointed up with lime mortar.¹¹⁴

BONDING SYSTEMS FOR MASONRY

A feature which is common in the masonry of many Byzantine castles is the use of timber bonding courses (fig. 93). Timber bonding is recommended by Philo of Byzantium¹¹⁵ but the use of it does not appear to have been widespread in the Hellenistic period. The use of timber bonds both in the structure of the wall and in the foundations of walls is recommended by Vitruvius.¹¹⁶ Caesar gives a careful description of the use of cribwork bonding by the Gauls in their fortifications and he remarked on the added strength that it gives to walls.¹¹⁷ It is clear from the regular series of beam holes visible in parts of the walls and towers that Aurelian built around Rome, and in Honorius' repairs to them, that timber tie beams were used throughout the whole height of the walls.¹¹⁸ Some timber bonding was used in the walls around Constantinople, but the extent and form is not clear.¹¹⁹ Photographs indicate that timber ties were also common in Roman civil and religious buildings, including those that are specifically claimed for the 'lime concrete' technique.¹²⁰

In the late Roman period a common method that was in use for bonding walls throughout the Empire was to lay several horizontal brick courses at intervals right through the thickness of the wall, and the best known example in fortification is the Theodosian land wall of Constantinople. The method of brick bonding continued to be used in the repair of the walls of Constantinople throughout the Byzantine period and right up to the Fourth Crusade. Brick bonding has been noted in the Anatolian provinces at Amasya, Nicaea, Ankara, and elsewhere, and there must be many more examples awaiting observation.¹²¹ But perhaps because the making of bricks was disrupted during the Arab raids, brick bonding courses became less common and they are replaced by timber cribwork. Timber was more fitted to the mortared rubble technique of Byzantine walls since it provided a practical, cheap, and fast method of bonding whereas the making of brick was a slow process. Random coursed walling and towers with regular holes both in the facing and in the core of the wall are a certain indication of timber cribwork bonding and this evidence is common in castle walls in Turkey, Greece, and the Balkans.¹²² Such walling has often been dismissed as late Turkish work and the beam holes are misleadingly represented as scaffold or putlog holes. Closer observation of numerous examples suggests that in fact timber bonding is an important feature of Byzantine building techniques. One proof that it antedates masonry of the late 12th or early 13th century is the example at Vahga castle in Cilicia.¹²³ The notion that beam holes are putlog holes is disproved by the pattern of stringers and tie beams at many sites.¹²⁴

It may be noted that timber bonding for masonry has the authority of the Book of Kings behind it¹²⁵ and it was an early technique in Anatolian and Gallic building¹²⁶ that may have become

confined to humble buildings when the sophisticated masonry of Hellenistic and Roman builders was currently in use.¹²⁷ It was therefore not invented by Byzantine builders, but like the use of mortared rubble it was an old technique brought back into wider use in the construction of fortifications. The common occurrence of bonding material, whether of re-used columns, brick, or timber, indicates the importance attached to these methods in the Byzantine period.

It would be interesting to know how far the timber bonding system continued in use in western European fortifications. Evidence derived from photographs and publications suggests that it did continue¹²⁸ as does observation of English and Welsh castles. Kidwelly has regular beam holes extending through the thickness of the wall in places and these certainly appear to have been made for a system of tie beams, but there appeared to be no trace of the stringers which would have formed an effective cribwork bonding. This may indicate a parallel and equally misunderstood inheritance like the use of horizontal brick or stone bonding courses that descended through to mediaeval Europe by way of examples of late Roman or early Byzantine masonry such as the walls of Antioch or Constantinople or of late Roman forts in Western Europe. The brick courses of Chepstow keep and the different coloured stone courses at intervals in the walls of Caernarvon are two well known examples which in fact perform no bonding function at all since the masonry change is confined to the facing and does not carry through into the core of the wall.¹²⁹ In contrast to the lack of horizontal bonding, the Normans appear to have been interested in the use of vertical bonding. Ashlar pilaster strips occur at intervals in the random course stonework of many keeps, and occasionally, as at Castle Acre, or at the White Castle, or at Lincoln, there are vertical courses of ashlar in the same plane as the wall face. These are difficult to explain except as vertical masonry bonds.¹³⁰

PLANNING

We have seen that in Asia Minor fortified towns had occasionally begun to be placed in naturally defensive sites by the time of Justinian. From an exceptional practice this became much more normal in the period of the Arab raids, and many of the great cities of the plain that did not disappear altogether were moved uphill to the nearest naturally defensible terrain. This inevitably resulted in a much greater freedom of planning in fortification and a return to the freely adaptable designs that are typical of Hellenistic fortification. The regular shaping of curtain walls and towers is replaced by designs that follow easily defensible terrain, and walls are made thicker or thinner according to the steepness of the slope to be defended, with variations from 60 cm up to about 3 metres in width. Sometimes there are simple and solid triangular or circular bastions, usually small, and sometimes there are rounded, rectangular or multi-angular towers of varying shapes and sizes.

THE ROOFING OF TOWERS

In rectangular and U shaped towers, barrel vaulting had been the normal form of roofing at least since the time of the walls of Aurelian at Rome.¹³¹ The square or rectangular towers of the walls of Constantinople still have barrel vaults or domical vaults of pitched brickwork, but the octagonal towers which have a circular interior are roofed with brick domes.¹³² The dome is the form used in the middle Byzantine period wherever massive enough towers were erected. Good examples are the towers of Kütahya (fig. 80). At the eastern end of the Black Sea the Byzantine fortress of Anakopi has a round tower with a massive fallen central pillar of masonry and brick.¹³³ The use of a central pillar perhaps suggests that some exceptionally heavy piece of artillery was kept on the roof of towers such as this.

In Crusader and Armenian towers barrel vaults, slightly pointed vaults or rib vaults are the normal form of roofing and the same forms are found in the mediaeval West unless both floors and roofing were of wood. It is interesting to speculate on the origin or the travels of the master mason who built the great domed keep of Pembroke.¹³⁴ This haunting anomaly is essentially Byzantine both in its form, and, as already remarked, in the constructional details of an outer surface rendering of lime, and the use of red pebbles and stone chips in the mortar, in imitation of pounded earthenware.

THE OPEN-GORGE TOWER

The tower of whatever shape with an open gorge at the back of it and wooden floors does seem to be a feature of the Byzantine period,¹³⁵ although it had previously been used by the Romans. There are examples in the outer walls of the upper citadel at Amasya. The reason for its use in this case is immediately apparent in that an enemy taking the lower outer towers would find no cover and quickly be shot down by fire from the towers above. The open gorge tower becomes increasingly popular in late Byzantine fortifications, as for example in the outer walls of Nicaea, presumably because it is cheaper and quicker to build than an enclosed tower. There are fine examples in the great fortress of Smederevo on the Danube (figs. 95, 96), which with its 26 towers, was completed in only three years from 1428–1430 by the Serbian Despot George Branković.¹³⁶ In the west it seems to appear about the year 1200 with early examples in the castle at Framlingham, and at Gisors, and it was used in the 13th and 14th centuries notably for town walls.¹³⁷

THE PENTAGONAL PROW-SHAPED TOWER (fig. 30)

Although a contemporary drawing by him does not exist, it is acceptable that Philo of Byzantium recommended this type of tower, and there are Hellenistic examples of the pentagonal prow tower at Paestum in Italy and at Isaura in Asia Minor.¹³⁸ The Romans frequently used U shaped towers but something like a prow is not found before the late 4th century fortress at Alta Ripa built by order of Valentinian.¹³⁹ In the 5th century it appears in the walls of Sergiopolis in the Syrian desert, and the great tower fortress of the southern wall of Antioch was in the form of a pentagonal prow, but it has long since been destroyed (figs. 22, 27, 31). In Cyprus there was a pentagonal prow tower at Saranda Kolonnes at Paphos, and this may be dated to the Byzantine period (fig. 97).¹⁴⁰ But the central piece of evidence for the Byzantine use of the pentagonal prow towers is the grand row of them in the citadel wall at Ankara, dated to the 7th century (fig. 11: Part III).¹⁴¹ Elsewhere in Asia Minor we have already noted the prow shape in towers at Amasya, Niksar, Attaleia, Alanya, and Toprakkale, and it also appears in the fortification of Cerasus on the Pontic coast.

In Greece there are prow towers at Didymoteichon in Thrace and there appears to have been a prow shaped tower of great size guarding the harbour of Salonica at the south western corner of the town.¹⁴² The prow tower appears in the Peloponnese at Mistra, the hillside successor to classical Sparta. The foundation of this town is attributed to Villehardouin, but there is nothing in the hilltop citadel and not very much on the site as a whole to indicate that Villehardouin did more than re-occupy a typical Byzantine hill town, established as the Byzantines gradually regained control of Greece with its substantial settlements of Slav invaders (fig. 20).¹⁴³

In the Balkans there was a row of prow towers at Durazzo (fig. 98), and the prow tower appears at Zvečan in central Serbia and at Ribnica in Montenegro (fig. 99). Zvečan is at the northern end of the plain of Kosovo on the frontier between the Byzantines and the Serbs. The latter is not far from Titograd, and it was on the Dalmatian frontier region; it is close to Docleia and

may perhaps be regarded as the Byzantine successor to the Roman town. At the other end of the Balkans, the fortress of Mavrokastron/Cetatea Alba, on the estuary of the River Dniester, has a series of prow towers.¹⁴⁴

Outside the Byzantine boundaries there is a Crusader prow at Chastel Blanc at Safita, in the inner ring of walls.¹⁴⁵ There are prow shaped towers in a few Spanish castles, some of them attributable to Arab influence.¹⁴⁶ In France the castle of Gisors shows an example perhaps dating from the time of Henry 1st, and in the late 12th century the prow shape was adopted for French keeps at La Roche-Guyon, Issoudun, and Château Gaillard. Other prow towers appear at Carcassonne and the prow or U shapes were adopted for the gate towers of Loches; St. Jean, Provins; Jouy, Provins; and Villeneuve le Roi.¹⁴⁷ The precise form varies and none are straightforward pentagonal towers of the Byzantine type but the principle of the prow or beak opposed to the enemy is unmistakable. In Germany there are numbers of examples, including Ostenburg in Bavaria and the keep at Araberg in Austria.¹⁴⁸ In Italy there are prow towers in the rectangular shell keep built by Frederick II Hohenstaufen at Prato in Tuscany between 1191 and 1193, and a 13th century example of Philo's saw teeth arrangement of prow towers along the curtain wall of the Saracen fort at Lucera in Apulia (fig. 100).¹⁴⁹ The prow shape does not appear to have become popular in Britain although it is possible that the keep at Helmsley, described as D shaped, was in fact a modified prow shape.

The Byzantine prow towers show a consistent distribution throughout the Empire, from the Balkan and Dalmatian frontiers in the north west to the Syrian frontier in the south east, with the largest number centred in Asia Minor. The earliest in date are from the 5th and 6th centuries at Sergiopolis, Resafa and Antioch in Syria and so these towers cannot be claimed as an Arab invention, and the fact that they appear in Balkan castles shows that they are not Seljuk. It therefore seems reasonable to suggest that the prow shape is characteristically Byzantine.¹⁵⁰ It was an Hellenistic invention, recorded if not invented by Philo of Byzantium, but it did not come into regular use until the Arab – Byzantine wars of the 7th to 10th centuries. Although there are Arab and Frankish examples of prow towers, the Frankish examples all belong to the 12th and 13th centuries and are certainly later in date than the Byzantine examples. The pentagonal prow never seems to have become a popularly accepted shape in the West, but it did outlast the mediaeval castle altogether as an influence in the design of fortifications and it re-appears in the earliest artillery fortifications in the old Italian manner. It was used by the Hospitallers at Rhodes, and by the Venetians at Famagusta, and from it developed the great arrow shaped Bastions of 17th century artillery fortifications.

The Use of the Sources

If we look at the sources for fortification some general observations about their use may be of interest. It is clear from the texts that the warring states of Greece took a great interest in the art of fortification and the proof of this interest lies in some of the actual fortifications that have survived. This was a period of fighting where relatively equal forces were involved and therefore every extra subtlety in the way of fortification or attack mattered and might give victory to one side or the other. In the period of the later Roman Republic and the early Empire, Rome was the supreme power and details of defensive fortification were not greatly elaborated. Caesar's concern was more with methods of attack rather than of defence. When barbarian threats did have to be taken seriously in the 3rd century A.D. the walls of Rome are more notable for their impressive strength than for any advance or subtlety in the design of the fortification. The four books of Vegetius, finding their source in earlier works,¹⁵¹ show that the organization of the army and its tactics were of greater importance to military men than the art of fortification, which receives only a summary mention in the 1st chapter of Book Four. The same impression is created by the *De Rebus Bellicis* which, like Vegetius, has only a few lines on fortification, but whereas Vegetius recommends irregular walls, the author of *De Rebus Bellicis* recommends tower forts at intervals, each with a wall around it.¹⁵² The 4th century date of Vegetius' work is perhaps supported by his preference for winding circuit walls to foil the artillery of the attacker.

The Hellenistic military theorists and their Roman followers appear to have become of purely academic interest in the West. It is in the Eastern Roman or Byzantine Empire that the Hellenistic texts were once again copied and improved upon, at least from the 6th century onwards,

and their influence is clear both in the new manuals, which repeat much that was previously said, and in the actual works of fortification, some of which have been described above. In the West the temporal gap seems to be much greater. It is not until the evidence of Geoffrey Plantagenet reading in Vegetius that we know of a classical military text in use, and the two or three lines devoted to the subject of fortification can have been of little profit to him in the construction of defence works. It is only in the late 12th and 13th centuries that Western mediaeval and Crusader fortifications begin to include in their construction some of the subtleties recommended by Hellenistic theorists, perhaps because this was once again a time of warfare between relatively equal forces, and the extra bit of skill might well swing the balance one way or the other in a siege. Pieces of literary evidence in the chronicles and elsewhere are only of value for dating if they are carefully checked against the evidence of the monument itself. Examples of the danger of using the literary source as primary evidence and fitting the archaeological evidence in with it are the castles of Greece where a number of fortifications that are probably Byzantine have been assigned without question to the Franks.

The evidence of inscriptions in walls or towers also needs careful checking with the style of masonry that surrounds it. This is because many conquerors felt an obvious proprietary need to commemorate the taking of a city or castle in visible form. An inscription carved in stone and set in a prominent place in the fortifications was an obvious method of permanent commemoration and it might sometimes claim more than was justified. Thus a re-building or strengthening of a wall or tower might more grandly be described as the building of it.

And finally in the monument itself the identification of the date of a prominent stylistic feature such as a gateway does not necessarily date the walls around it. A Byzantine gate might have a cross and an unwelcome inscription or decoration over it which a Moslem or Frankish conqueror would remove in order to substitute a gateway in his own style.

As a general rule it can be stated that once a site was fortified it would only be severely damaged by an earthquake. Sieges would affect small sections of wall and a tower or two, and the most that a conqueror needed to do was to repair and strengthen. Changes in the style of fortification might add some significant new feature but it is highly unlikely that a conqueror would have demolished a whole fortification as a deliberate act. The labour and materials and time involved in a complete re-build would have rendered this impractical.

CHAPTER 6

The Byzantine Legacy and the Frankish Use of it

In examining Byzantine fortifications my purpose has been to clarify by examples the opinion commonly stated that the Crusaders learned something of the art of fortification from the Byzantines, and the more important points are here summarized by way of a conclusion. In terms of planning, the inner strongpoint of a fortification in the form of a citadel or shell keep was not an important part of Roman military thinking since the might of Rome usually made it unnecessary. It re-appears under the Later Empire in the period of Barbarian invasions in the West and Persian invasions in the East, and new citadels were specifically added to frontier towns such as Zenobia on the Euphrates. Old citadels in towns that had always remained centres of population such as Salonica or Antioch were repaired and re-fortified. In the Byzantine period the citadel (or shell keep) becomes a permanent feature of fortifications whether they be small castles or large towns.

By the end of the 12th century the Hospitallers had adopted the citadel or shell keep for Krac des Chevaliers, and it becomes a common form in European fortification of the 13th century. Castle Acre, Framlingham, Kidwelly, and the Edwardian castles of Wales are as well or better understood in the context of the strongpoint or citadel tradition pertaining to a town, than as developments out of the tower keep.

The tower fortress or keep (fig. 28), and the glacis or talus were both described by Procopius in the 6th century and there are many examples of the tower fortress from the 6th century onwards and commonly from the Byzantine period; among them are examples such as the great tower at Nicaea which the Crusaders besieged, and the great tower on the southern wall of Antioch which Crusaders held and used for nearly two hundred years.

The articulation of the curtain wall with rectangular, polygonal prow shapes, and round towers (figs. 28, 29, 30), was a regular and principal part of Byzantine fortification and the principle of fire from towers to cover the connecting curtain wall, and concentrically from inner towers and walls to cover an attack, or fire simultaneously with outer towers and walls at a lower level, was also known and used at least from the 5th century A.D. onwards, notably in the walls of Constantinople (fig. 101). It re-appears less frequently in Byzantine and in Crusader sites since these are frequently in hilly terrain where steep slopes left neither room nor need for double walls and ditching. One particular shape of tower, the pentagonal prow or wedge, appears in Late Antiquity but only became popular in the Byzantine period, of which it may be said to be a hall mark. We have seen that this form of pentagonal tower was probably recommended by Philo of Byzantium, but the lack of need for such a strong defensive feature delayed its introduction into more general use until the time of the Arab-Byzantine wars, when the strength of Philo's recommendation was appreciated. It does not seem to have found general favour outside the Byzantine orbit, but there are a number of examples in Italy, Spain, Germany and France, and the Franks took enough note of it to use it for the towers of several important fortifications. It received its final accolade in being almost the only feature of mediaeval fortification that was found to be well adapted to withstand gunpowder and cannon since the acute angle presented by the prow allowed a good chance of enemy cannon ball glancing off as a spent force.

Many of the basic elements in the Crusader practice of fortification can therefore be shown to have been currently in use during the Byzantine period, sometimes in places that the Crusaders saw and conquered for themselves. It may still be argued that this is coincidence and that the crusading Franks evolved their new fortifications without outside help, or possibly with the help of Classical texts rather than Byzantine models. This is a matter of opinion, but in the light of the examples discussed above the writer finds it difficult to believe in the hypothesis of independent evolution.

In respect of masonry techniques, the Crusaders do appear to have taken their own decisions and ignored the Byzantine development of the mortared rubble wall for the purpose of fortification. Instead they took up the earlier tradition of monumental masonry still practiced in Syria, and there is perhaps even an echo of Hellenistic building practices in the corbelled arches that the master mason James of Savoy introduced into the Edwardian castles of Wales. In Crusader walling the rubble core is still present to add thickness, but the essential strength of a wall was both seen and believed to lie in the size and thickness of the facing blocks. The reversion to smaller ashlar blocks in the 13th century Crusader castles, and the appearance in Western Europe of the mortared rubble wall with a thick surface rendering of lime may betoken an understanding of the Byzantine tradition or it may represent an independent evolution in East and West of masonry techniques inherited from the late Roman and early Christian period. Much more research in this area is needed, and it must be studied in conjunction with the development of Norman building techniques and the emergence of the Norman masonry castle from its primitive timber predecessors.¹⁵³

In the matter of size there appears to be a marked difference between Byzantine and Crusader fortifications. The typical Crusader fortification is small and compact whereas Byzantine fortifications such as Ankara, Antioch, Kütahya, or Şebinkarahisar, sprawl in an untidy fashion over a vast area. But this difference is more of appearances rather than one which arises out of any basic change of principle. There is a general difference of scale resulting from the more abundant manpower of Byzantine as opposed to Crusader armies, but it is wrong to make a contrast between the Byzantine fortifications that we have discussed, which were destined to protect large towns, and Crusader castles which were designed to accommodate a lord and his

followers, or a garrison for one of the military orders. Corycus is an example of a smaller Classical and Byzantine fortification more in keeping with the size of Crusader works. Byzantine family castles and military stations have not been included here for lack of space, but these are on the same kind of modest scale as most of the Crusader fortifications.¹⁵⁴

The differing requirements of Crusaders and Byzantines could occasionally meet, as is shown by Crusader occupation of the rambling Byzantine castle and citadel of Saône, but it must be remembered that the castle of Saône was for the Byzantines only a citadel or fortified refuge, as a walk to the east reveals; beyond the great ditch are the remains of walling and plentiful potsherds giving evidence of the town for which it served as the refuge.¹⁵⁵

Finally if we look at matters of detail there is evidence of definite improvements in Crusader and Western European castles, albeit that most of these improvements had already been thought about by the warring states of Hellenistic Greece. The serviceable but simple Byzantine embrasure or loophole was developed into a variety of shapes to give better cover and a wider arc of fire; and more or less direct downwards fire was made possible by external splaying at the base of the loopholes (figs. 102, 103, 104). The wall walk arrangements were improved by allowing two tiers of fire instead of one, and machicolation was made a standard and more readily usable feature of walls and towers. Further defensive fire power was added by piercing the curtain wall with firing slits, and the sum of these improvements resulted in a much increased ability on the part of the defenders to keep an enemy well away from the walls and towers and prevent him from mining or bringing up siege weapons for close fire. The defences of the gateways were improved and strengthened by such additions as the third tower, of which there are examples at Jerusalem and at Denbigh, and by the addition of firing slits and sally ports in the walls of the entry passage, and meurtrières in the roof of it. And the masonry of the walls and towers was made stronger and thicker to withstand mining and battering by siege artillery. It is in these things that Crusader and western European military engineers showed a more meticulous attention to the minutiae of the art of fortification, and from this attention to detail sprang the re-discovery of the old and the birth of new ideas out of which were created the impregnable defences of the great 13th century castles of western Europe.

Constantinople

THE LAND WALLS

The greatest of Byzantine fortifications, the walls of Constantinople, successfully defended the capital for over a thousand years. These walls, which in their present form date from the mid-fifth century, have two main parts: the land walls, the subject of the present discussion, and the sea walls, which will be considered subsequently. The formidable barrier of the land walls, which cuts off the peninsula on which the city was founded and virtually turned it into an island, resisted Attila and all succeeding assaults until the age of gunpowder when it finally succumbed to the cannons of the Turks in 1453. During the whole Byzantine period, the walls were constantly maintained and repaired, but no fundamental change was made to their circuit beside a normal adaptation to the changing techniques of defence. As long as the Byzantines enjoyed a technological superiority over their enemies, the walls of the fifth century, with their later modifications, were more than adequate.

The land walls are well known from historical sources, inscriptions, and particularly from their well-preserved remains. Virtually the entire circuit is still standing to form the most imposing example of a Byzantine fortification. Since these walls exhibit work of all periods, and since other fortresses might be expected to have taken them as a model, they may form a suitable introduction to the subject. Their variation in method of construction and style of decoration should provide a conspectus of the whole range of Byzantine work, and the changing or static techniques of defence which they employ should give a clear view of the nature and intent of Byzantine fortifications. The walls may therefore be considered first in a historical perspective, then for the system of defence which they represent, and finally, and in most detail here, in their varying styles of construction.

HISTORY

The land walls are a product of the reign of Theodosius II (408–450); they were begun in 412 and completed in two years.¹ Before the reign of Theodosius had ended, they suffered their first disaster which, typically, was inflicted by the hand of nature, not man. For over a millenium, the walls were never successfully stormed, but on many occasions earthquakes levelled large parts of them. In the first such event, in 447, fifty-seven towers collapsed, to be rebuilt in the remarkably short space of six months.² A century later, toward the end of the reign of Justinian, earthquakes inflicted severe damage in 554 and 557; this was apparently repaired by Justin II (565–578). Inscriptions show that Justinian II (685–695, 705–711) rebuilt a section of the walls, while more extensive work was carried out by Anastasius II in 714, in anticipation of the massive Arab attack which was successfully repulsed by Leo III in 718 after a bitterly-fought siege. Leo, in his turn, had to make extensive repairs as the result of a devastating earthquake in 740, and his grandson Leo IV (775–780) rebuilt several towers in the southern half of the circuit under circumstances which are no longer known.³ The ninth century saw major activity in the northern part of the circuit, where an outer wall was added by Leo V (815–820) and the inner wall completely rebuilt by Michael II (820–829). Similarly, Basil I reconstructed towers of the southern part between 868 and 877. Romanus II (959–963) made further repairs, while the earthquakes of 986 and 987 would have occasioned further work. Numerous earthquakes in the eleventh century probably damaged the walls; repairs of Romanus III (1028–1034) may represent a response to one of these.⁴

The greatest change in the circuit took place under Manuel Comnenus (1143–1180) who built a completely new wall in the northwest to encompass the palace of the Blachernae; this wall, as will be seen, was the first to utilise new methods of defence. Further restoration took place under Alexius III (1195–1203), but no repairs are attested for the period of the Latin Empire (1204–1261) whose poverty probably precluded major undertakings of the sort. Not long after the Byzantine recapture of the city, Michael Palaeologus ordered the walls raised and executed an extensive restoration to compensate for the damage and neglect of the Latin interregnum. His son, Andronicus II, similarly restored and rebuilt large parts of the walls, probably around 1288. Earthquakes in 1344 and 1354 wrought further destruction, some of it repaired by John V (1341–1391). The last, and most extensive, Byzantine restoration primarily effected the outer wall, rebuilt in 1433–1448 in a last vain effort to repel the Turkish threat.

The Turkish conquest by no means meant the end to maintenance of the walls. In fact, one of the first acts of Mehmet the Conqueror (1451–1481) was to repair the section which had been damaged in the siege of 1453, and the fortifications were maintained in functioning condition through the early years of the eighteenth century. The Turks, like the Byzantines, often had to repair the damage which earthquakes, always the greatest source of troubles, inflicted. Substantial repairs were thus made in 1509, and in 1635, when most of the circuit was rebuilt and covered with a layer of plaster to conceal the decayed condition into which it had by then fallen. Further repairs followed in 1656, and further earthquakes in 1690 and 1709. The last major repairs, which involved the restoration of the whole circuit, were the work of Ahmet III from 1722 to 1724. Since then, the walls have been allowed to fall into decay until recent years. These centuries of neglect reveal, however, the great strength of the original structure and of its various repairs, for the vast majority of its walls and towers, at least of the larger inner circuit, are still standing.

TECHNIQUES OF DEFENCE

During every period of their existence, from the fifth to the eighteenth century, the walls saw repair, reconstruction and even occasional replacement. For the most part, these alterations

brought no fundamental change to the system of defence conceived and executed under Theodosius II, although late work shows a necessary adaptation to the changing techniques of warfare. The fifth-century work may therefore be considered in some detail before approaching the modifications to which it was eventually subjected. In all cases, it is important to remember that the walls were of little value by themselves: they had to be manned, and the troops had to have appropriate equipment. The discussion which follows will therefore pay some attention to the defensive artillery in the context of the walls and towers where it was employed. Consideration of this form of defence will help to understand some of the peculiarities of the walls, while they in turn will assume, at least in the mind's eye, a more realistic aspect when provided with armed defenders.

The complex fortifications of the fifth century provided the two elements essential for defence: obstacle and protection (figs. 1, 1a). The former was assured by a broad, deep ditch flanked by a crenellated balustrade, and by the low outer circuit wall. These kept the enemy at a suitable distance to remain under the fire of the main protection, the high inner wall.⁵ In fact, he would have faced considerable problems long before he drew near the ditch, for the artillery of the defenders could easily have covered an area of some 200 metres beyond the first line of defence. In this, the aim of the defence was not only to kill enemy troops, but especially to prevent them from bringing siege equipment near the walls. Enemy artillery, siege-towers and protective devices posed a far more serious threat than the troops themselves, no matter how numerous or well-armed they were. Defenders would hope to damage or demolish such equipment long before it reached the first obstacle, and certainly to launch a serious bombardment as soon as it was stopped by the ditch.

If he survived the long-range arrows, stones and sling-bolts, the enemy would have to cross the ditch, which for most of its length was filled with water, then scale the wall behind it before arriving at the broad platform in front of the outer wall, where he would be exposed to fire from both circuits of walls. If he managed to break through the outer wall, he would find himself on a similar platform facing fire from the high massive walls and towers of the inner circuit. The distances involved were substantial: the ditch was more than seven metres deep and eighteen broad, and the balustrade added some two metres to the height of its back wall. The terrace behind this was from 12 to 15 metres wide, and the outer wall rose some eight metres above it, with its towers some 50 centimetres higher. The space between the walls, where troops could be mustered for sally or defence, was over 14 metres broad, and the final obstacle, the great inner wall stood twelve metres high, with its crenellations reaching another two metres, and its towers rising to a height of almost 20 metres. Altogether, the enemy had to face a barrier more than 65 metres broad which rose over 30 metres from the bottom of the ditch to the top of the towers.

To some extent, the formidable mass and height of the barrier was designed to compensate for strategic weakness: with the exception of one later section on the north, the wall can take advantage of no steep slopes or natural defences, but follows the gently rolling contours of the featureless Thracian landscape. It had therefore to be built on an exceptionally large scale, and its planning will have presented problems not to be found in the many town walls and fortresses which stood on steep hilltops. The conception and execution of these walls, as already noted, was highly successful, and their example naturally had great influence. To understand better the skill of the builders and the fortifications which they thought necessary, the individual elements may be examined more closely.

The outermost obstacle, the ditch, calls for no special comment beyond noting its great breadth and depth. It was divided periodically by stone dams which prevented the water it contained

from flowing away along the slopes on which it was built, and was crossed by wooden bridges before the city gates. The walls of the ditch were built of mortared rubble with bands of brick which represent different, but undetermined, periods of construction. Since it is now almost entirely filled with rubbish and market gardens, it cannot be studied.⁶

The upper part of the back wall of the ditch was crenellated, apparently in a late period. The simple crenellations, about the height of a man, would have offered protection to archers who could shoot across the ditch, and to troops who might be mustered in front of the outer wall. The wide embankment between ditch and wall not only provided ground for deployment of troops but further widened the distance between the enemy and the main fortifications. Since this area, like all spaces before the walls, was kept clear, an enemy who penetrated it would be exposed to the full fire of both circuits before he could even launch an attack on the low outer wall.

The outer circuit wall, in origin a product of the fifth century with much rebuilding in the desperate days of the fifteenth, rose some eight metres above the outer terrace.⁷ It was faced throughout with small limestone blocks separated by bands of bricks. The lower half of this facing, as seen from the outside, concealed a solid mass of fill which continued behind to form the inner terrace. In this way, the wall would be virtually impervious to battering and extremely difficult to undermine. The upper part of the wall, which rose four metres above the inner terrace, contained two levels of defence. The lower consisted of an endless series of casemates about a metre and a half wide and three deep, constructed with side walls perpendicular to the main wall; the circuit contained some 2 500 of them. These casemates present three main varieties of construction in which the side walls are bonded or not to the main wall, and the arches above are parallel or perpendicular to it. Each contained an embrasure about 60 centimeters wide and as much as two metres high, which indicate that the casemates would have been suitable for the installation of small ballistas.⁸ Their design, however, seems poorly accommodated to artillery, since the embrasures are often inconveniently close to the side walls; such wide openings at a low level might also have offered tempting targets to an enemy. They were apparently not a success and were blocked to become narrow loopholes about 20 centimetres wide and a metre high; through these, an archer might most appropriately fire.⁹

The side walls of the casemates supported brick arches which in their turn held up the second level of defence, the crenellated battlements with their wall-walk paved with brick. These would have been manned by archers and perhaps slingers. The curtain wall was bonded with alternating semicircular and rectangular towers, each of which stood in front of a section of curtain of the main wall. Their separations thus corresponded with those of the towers of the inner wall. They were built in the same style as the curtain, from which they projected about five metres and above which they rose only about 50 centimetres. All towers had two levels of defence, the lower consisting of vaulted chambers with loopholes — usually three in the square towers and four in the round — and the upper, a crenellated platform. The chambers were suitable for archers, while a small catapult could be mounted on the platform. The towers thus offered forward and flanking fire to protect the outer terrace and the curtain. In addition, some, if not many, of the square towers had a chamber at the level of the outer terrace which gave access to a postern on the right side of each tower; these were so designed that the soldiers would be protected by the shields on their left sides as they exited.¹⁰ Gates of the wall are poorly known; one surviving example resembles two towers joined together to form a long thick wall pierced by a simple opening with a porcellis and protected by the usual two levels of defence.¹¹ Although the present remains of the outer wall may seem insignificant, it performed the twin functions of obstacle and protection, and was considered so important in the fifteenth century that most of the efforts of repair then made were devoted to its rebuilding.

Behind the outer wall, the broad inner terrace, or Peribolos, stretched for some 20 metres. This was of particular importance in the defensive system since the troops who would defend the outer wall or make sallies beyond it were mustered here. In time of need, catapults could be installed and used to fire over the outer wall, taking advantage of its protection.¹²

The most imposing part of the fortifications was the great inner wall, which towered over the rest.¹³ As the most powerful part of the system and the final defence of the city, it was built first, and on a grand scale. On the average, it was almost five metres thick and rose to a height of 12 metres. Its structure, which rested on bedrock, consisted of two parts, an outer facing and an inner core. The facing, or shell, was of well cut limestone blocks, carefully squared; the filling was of mortared rubble. Bands of brick interrupted and decorated the stonework and ran through the wall to provide a bonding for core and facing and levelling layers for the rough inner material. A section of wall usually contained six such bands and ran straight for 30–70 metres; curtains varied considerably in length, but the separation between the towers was always less than the reach of an accurate bowshot. The wall presented a smooth facade without loopholes, for the defence of the lower part depended on the outer wall, a phenomenon which shows clearly that they were planned as part of one project. The defensive zone of the curtain wall consisted of the wall walk which seems to have been paved with brick and slightly inclined inward for drainage. The troops who manned it were protected by battlements with merlons about two metres high reinforced by small crosswalls to prevent them being shot off by the artillery of the enemy.

Between the Sea of Marmora and the Palaeologan palace now known as the Tekfur Saray (which marks the end of this section of walls), the curtain was crowned with 95 towers which rose to a height of twenty metres (fig. 2). As a rule, they were not bonded with the wall, and appear to have been constructed after it. The vast majority of them are square, about ten metres wide and projecting 10½ metres, but twenty are polygonal. In the southern part of the walls, square and polygonal towers alternate; then a stretch with square towers only follows; and finally, polygonal towers appear at irregular intervals. The stonework of the towers is like that of the walls, but their structure is quite different. The square towers have walls about two metres thick — the front is thicker than the sides — and are divided into two quite distinct chambers, not connected with each other. The lower chambers, roofed with brick vaults and lighted by narrow loopholes, open to the inside through large arches. Many of them contain posterns (usually on the north side) to give access to the inner terrace. The main purpose of these chambers, at least in peacetime, seems not to have been defensive, for laws of Theodosius II allowed soldiers to reside in them temporarily and neighbouring landowners to make use of them. In war, however, they would have been valuable not only for storage of material, but for supplying troops to a threatened area without having to open the city gates; archers firing through their loopholes (in the towers which had this feature) would have given additional cover to the Peribolos.

The upper chambers were reached from the wallwalk which was itself approached by a series of stone stairways erected at apparently irregular intervals against the inner face of the wall. These rooms overlooked the outer wall and were essential for defence. Each of them had eight embrasures: two in the front, and three on each side. The chambers had ample space for the installation and maneuver of ballistas, while the embrasures provided openings suitable for aiming them and discharging their missiles.

In Late Antiquity, one of the main engines of attack and defence was the ballista which shot bolts resembling long and heavy arrows with a large iron head. Two kinds of ballista were in common use: a portable weapon for service in the field, and a stationary machine of considerable dimensions worked by two men winding a windlass to provide the torsion which could

propel a bolt to a great distance. The effective range of the large ballista has been estimated at 400 metres or more. Such machines, mounted on pivots or wheels, could be maneuvered to cover a wide field of fire and could shoot with a higher or lower trajectory.¹⁴ They would have been mounted in the chambers of the wall and used with deadly effect against an enemy long before he reached the ditch. The arrangement of the chambers with their several embrasures and relatively narrow openings to the wall-walk (on the average about a metre wide and two high) suggests that relatively small ballistas were used, probably one to each embrasure. If their range was less than that of the larger machines, they would still be able to cover the far side of the ditch, leaving longer ranges to the catapults mounted above.¹⁵

The covered chambers with their various openings could have provided adequate cover for men and machines; the embrasures, rather than loopholes, were essential for successful operation: they would enable the artilleryman to sight more accurately and to increase the range of his fire, actions for which loopholes were inadequate.¹⁶ Thus, the presence of loopholes or of embrasures may be taken as evidence for the kind of defence practiced in a particular section of wall.

The polygonal towers differed only in details: in them, the lower chamber is cylindrical and seems generally not to have contained a postern, while the upper is circular with eight niches of which the outer five contain embrasures. Trace of painting in both kinds of towers suggest that some, perhaps many, of them were decorated with the images of saints, an inspiration and spiritual defence to supplement the physical apparatus around them.

The second defensive level of the towers was the crenellated platform which each supported. This was used for the installation of catapults, or mangonels, whose role was complementary to that of the ballistas. The catapult of the day was the Roman *onager*, a one-armed stone-throwing machine, more bulky and less sophisticated than its antique predecessors, but simple of construction and reliable in use. This, too, came in two versions: a smaller field piece and a larger static machine, such as would have been mounted on the tower platforms. A large catapult could project a stone of a talent's weight (about 30 kg.) to a distance of some 400 metres. As the ballista was effective against personnel, so the catapult was used to attack and destroy the machinery of the enemy. Its role for defense and attack was equally critical. Since the catapult had a long arm which needed room to swing, it could not be installed in a covered chamber, but stood necessarily in the open, on the roof.¹⁷

The gates of the inner wall display much variety, but their original form is usually impossible to determine because of rebuildings. They range from the magnificent Golden Gate constructed of marble at the southern end of the circuit, the imperial entrance to the city, to simple openings entirely for military purposes. All have in common, however, twin flanking towers and straight entrances.¹⁸ Unlike the towers, the gates of the inner and outer walls are in alignment to provide a straight entrance and exit, and at the same time an almost enclosed rectangular space protected by four towers.

Such a massive bulwark required a large number of defenders. A force of about 10 000 would have been needed to man the walls adequately, counting only those posted on the inner and outer circuits.¹⁹ In peacetime, of course, far fewer would have been needed, but war would have required many thousands of additional troops to make forays and to provide a reserve for the most threatened areas. Manning the walls was an unglamorous job with little prestige. In Late Antiquity, detachments of the field army, under the name *pedatura*, were seconded to this job. Their numbers were supplemented by mobilising members of the guilds and of the citizen body. This service had none of the prestige or influence of the other troops in the capital, the imperial guards of the *scholae* and *excubitores*. The situation had changed little by the tenth century,

when the *numeri* and *teichistae*, whose officers held the lowest of ranks, performed a similar function, supplemented in their turn by the citizen militia.²⁰ In the final days of the city, mercenaries performed much of this service, and Italian troops were an important contingent in the last defence of 1453, when 8 000 men had to cover the vast circuit of land and sea walls.²¹

This unified triple system of defence, with the ditch and two walls, was maintained for over a thousand years from the shore of the Sea of Marmara through 5 650 metres to the region of the Blachernae. Beyond that point, it originally connected with an independent and apparently earlier circuit of walls which surrounded the Fourteenth Region of the city. Isolated fragments, some poorly preserved, have been discovered and identified; although they present evidence for defensive techniques, they are not adequate to support profitable discussion.²² The following section, therefore, will deal with the standing remains of the walls which replaced them. These fall into five divisions: the wall of the Tekfur Saray between towers 96 and B1; the wall of Manuel Comnenus with towers B1-B13; the wall of the Blachernae palace formerly known as the Prison of Anemas; the double wall of the early ninth century; and the single wall of Heraclius which connects the land walls with those of the Golden Horn (fig. 2a). These represent a variety of periods and defensive techniques and are of such complexity that a rather more detailed treatment than their length might seem to warrant will be necessary.²³

The first, and shortest, section of these northwest fortifications stretches for about 120 metres from the point, after T96, where the Theodosian wall bends to the north, to the beginning of the wall of Manuel Comnenus. It forms the base and defences of the Palaeologan palace and its courtyard, and follows the line of the outer Theodosian wall, parallel to the ditch and about 25 metres behind it. The wall was defended by a series of embrasures built along a vaulted passage and opening about three metres above ground level. The now-vanished crenellations would have provided a second zone of defence. A large square tower protected the angle where the wall turned to the north and with it the entrance to the palace. It is comparable in size and plan to the towers of the inner Theodosian wall, but is evidently of later date and was in fact built to replace a tower of the outer wall. Its defences were from loopholes in an upper chamber, originally entered from the wall-walk of the curtain. The other two, semicircular, towers of this section are comparable to those of the outer wall. They contained two levels of chambers with three loopholes each to provide fire across the ditch and along the flanks of the wall. Between them was a simple gate in the line of the wall, protected by a portcullis. The chronology of this wall has not been established with any accuracy; it is clearly later than the Theodosian wall and earlier than that of Manuel. A date of c.1000 has been suggested.²⁴

The most imposing fortifications of the region comprise the wall which makes a large bend to the west, around the hill on which the palace of Blachernae was built. It consists of two distinct parts, and represents a major change in the techniques of defence. Both parts were built by Manuel Comnenus in the late twelfth century.²⁵ In the southern part, horseshoe-shaped and octagonal towers alternate as far as a gate which is followed by two octagonal towers. Thereafter, the northern part of the wall, built in a distinctive masonry, contains only square towers. The wall is a single rampart. Its connection with the wall of the Tekfur Saray blocked the Theodosian ditch altogether, and its location at the edge of a relatively steep hill precluded construction of an outer wall or ditch. As a result, its towers stand closer together than those previously considered, with separations ranging from 18 to 38 metres. The towers are of varying sizes and project as much as 18 metres from the curtain with which they are bonded. As in the Theodosian wall, these towers had three levels: a lower chamber with no loopholes or postern opening to the outside; an upper chamber with three to six narrow loopholes to provide fire in all directions; and a crenellated platform on top. There were thus two levels of defence to cover the slopes of the hill and the flanking faces of the wall.

These towers differ in several respects from those of the Theodosian wall. They are of exceptionally massive construction with walls four to five metres thick which occupy the bulk of the structure, leaving only relatively narrow interior chambers to give access not to embrasures, but to loopholes. To some extent, the thick walls could have been built to compensate for the lack of an outer wall or ditch, but the total configuration suggests that a different system of defence, in which thick walls had a place but embrasures did not, was intended. Unlike the Theodosian, these chambers offer little room for manoeuvre: artillery could not be moved around in them, nor could it practicably be fired through the loopholes. These towers need not, however, be considered to represent a regression from artillery to simple archery; rather, they may be seen as a response to a new technology. The age of the Comneni saw an increased contact between East and West which began with the First Crusade. By that time, western Europe had made an important advance in military technology which came as a surprise to the Byzantines. Anna Comnena, in her account of the arrival of the crusaders in 1096, describes the working of the crossbow, a weapon then unknown to the Greeks. Although the weapon she described was of a fairly primitive kind, it was soon much improved and gained an especially deadly reputation. So effective was its shot and so dreadful the wounds that resulted that its use was prohibited several times during the twelfth century. The crossbow was a kind of miniature ballista and shot an arrow with tremendous force over a great distance comparable to the range of the larger machine.²⁶ Such a valuable invention could hardly be ignored, least of all by Manuel Comnenus, a great admirer and imitator of the West and its technology. Consequently, the chambers in the walls which he built may be seen as designed for crossbows, smaller and more convenient weapons which would have replaced the earlier ballista and in the process influenced the design of the towers.

The massive bulk of these towers may have a similar explanation. Such a tower would have been able to support a far greater weight than was previously thought necessary. During this period, another advance in military technology wrought a considerable change in warfare. A new kind of artillery, the trebuchet, was introduced into Europe in the twelfth century, taken up by the crusaders, and rapidly spread through the Mediterranean and Near East. This machine was worked by a counterweight, using the force of gravity rather than that of torsion. As a result, it had far greater force, and could project a stone of 150 kilograms for some 300 metres – a vast improvement over the catapult. The trebuchet was large and bulky: it could have an arm more than 15 metres long and a counterweight of ten tons. Its immobility was of no disadvantage in defensive positions, and its increased range and power soon made it essential.²⁷ Its bulk and weight demanded a more solid platform, such as that provided by the towers of Manuel, who reigned when the new machine was coming into common use. It is possible therefore to associate the bulk of the towers, like the reduced chambers, with the introduction of a more advanced technology, and to view these towers as innovative structures designed for defense by trebuchet and crossbow rather than the old catapult and ballista. The walls, then, underwent a major change in design, and the Byzantines showed themselves capable of adapting to the needs of new technology in a way which has not previously been noticed or explained.

The curtain wall of Manuel was three metres thick on the average, and was reinforced by a series of arches which supported a wide crenellated wall-walk; the wall-walk of the northern half, however, was narrower. The wall had no loopholes, but was defended from its battlements alone. Altogether, the Comnenian defensive system here consisted of the battlements of the wall and the loopholes of the towers, both at the same level, and the platforms of the towers, which stood some four metres higher. This section of wall contained one gate and two smaller gates or posterns, all built in the line of the wall. In each case, these were built adjacent or close

to the south side of a tower, so that defenders making a sortie would be protected by their shields on the left, and by the towers on their right sides.

The following short section, consisting of tower B14 and the substructions of the palace of the Blachernae, is extremely complicated because of a series of rebuildings.²⁸ In its original state, the wall, as preserved deep behind the long series of substructions known incorrectly as the 'Prison of Anemas', stood some twelve metres high and had a series of chambers with loopholes about five metres apart connected by a vaulted passage; its upper defensive zone was the crenellated wall-walk. Later, this was raised, and the battlements converted into a series of chambers with loopholes; finally, it appears that a third level of chambers was added, evidently in replacement of the lowest, whose loopholes were blocked. Although inaccessibility makes the various stages of rebuilding difficult to clarify, it seems clear that a basic system of two or three superimposed defensive zones was maintained for a considerable time. The preserved part of this wall, about 65 metres long, seems not to have contained a tower. The earliest phase has been associated with the fortification of the northwest suburb and supposed to antedate the Theodosian walls; no date has been proposed for the rebuildings.

This wall in its entirety was subsequently blocked by the addition of a series of long rectangular chambers which formed at the same time the support for the palace of the Blachernae and a new defensive zone. Fourteen of these have been preserved behind an outer wall 75 metres in length and over 20 in height. They are separated by side walls built directly against the older wall, and were divided into two levels by a wooden floor. Since each level had loopholes, the wall was defended at three levels.

The final stages of this complex development were formed by the double tower B14 which was built against, and blocked, the seven southern chambers of the substruction.²⁹ The earlier southern phase of the tower differs in conception from the fortifications so far considered. It was apparently a square of about 14 metres on a side with square projections on both sides; the northern contained a stairway. Two levels of loopholes on the projecting sides defended the tower. The main part, however, contained a large room, about seven by nine metres and six metres high, lighted by three tall round-headed windows which gave access to a broad balcony supported on projecting marble columns. This room was connected through the southernmost of the rectangular chambers with the courtyard of the palace of the Blachernae, of which it evidently formed a part. A similar room at a lower level opened through a large rectangular window to another balcony. The main purpose of this tower was plainly other than defense; it was a residence built by Isaac Angelus as an extension to the palace, and its purely defensive aspect seems to have been limited to the crenellated platform of the roof and the loopholes of the stairway turret.³⁰ In the late thirteenth or early fourteenth century, the tower was extended by an addition on the north which almost doubled its bulk. This too contained two storeys: the upper, at the level of the lower chamber of the original structure, was lighted by a large arched window, while the lower room had only a loophole. The crenellated platform of the addition was at the height of the upper chamber of the original. The purpose of the addition was also residential. In a final stage, a thick battered buttress was added around the lower parts of the double tower.

The following northwestern end of the wall, in its present form a double wall of the ninth century, had an equally complicated development.³¹ The earliest stage is represented by poorly-preserved remains on the inside of the lower part of the wall between towers B15 and B16. This has a series of arches supporting a wall-walk, but apparently not giving access to loopholes; the defensive zone was evidently restricted to the top of the wall. This wall constituted part of the original defences of the fourteenth region. Later, apparently in the reign of Theodosius II, a projecting wall was added on the north to block passage along the shore of the Golden Horn.

It displays a feature unique at Constantinople: the wall was defended on both sides by a series of alternating loopholes along a vaulted passage, so that fire could be directed toward or away from the city. It was thus somewhat thicker than normal, about five metres. Whether, as might be supposed, it had a corresponding double row of crenellations, cannot be determined. This spur wall ended near the Golden Horn in a square fort which was replaced by the present tower B20.

Major changes effected this area in the early ninth century. First, an outer wall was built by Leo V (815–820) parallel to the spur, and enclosing the area between towers B15 and B17. Its poorly preserved remains, mostly obscured by later rebuilding, only show that the southwestern part had an inner row of arches to support the wall-walk, and that the outer face incorporated an earlier building whose windows were narrowed to form loopholes.³² This wall blocked the inner wall and effectively made it useless, until it was transformed by the addition of three massive polygonal towers, perhaps the most impressive in the whole circuit. The southernmost, B15, stands 26 metres high; like the others, it is some 12 metres wide and projects an equal distance from the curtain. Its lower chamber was entered from the city and its upper room, the main covered defensive zone, was reached from the wall-walk and had five large embrasures. Further defences would have been mounted on the crenellated platform, but this has succumbed to a later restoration which raised the tower to add a second covered chamber with three embrasures and access to a new crenellated platform. The other towers are similar, each with a main chamber containing five or six embrasures.

Apparently as part of the same project which built these towers, the outer wall of Leo was remodelled to form a unified double defensive system for this particularly flat and exposed district. In this, a new southern front was added. Its lower part contained a series of loopholes connected by a vaulted passage which in turn supported the battlements. An inscription shows that this was built by Michael II (820–829). A larger extension was added in the north, where an upper and lower level of loopholes, together with the battlements, provided three lines of fire. Its date has not been determined, but its construction would have been previous to the reign of Romanus III (1028–1034) when a tower was built over a corner of the wall.

The final section of the land walls was built by Heraclius around 626 to protect the church of the Blachernae. Its course, which contained about twelve towers, has been much rebuilt; it is poorly preserved and offers no distinctive peculiarities. The towers, all square, had vaulted chambers with loopholes on each side and the usual battlements. The surviving remains will not support any detailed analysis.

The early stages of the complex northwest circuit of walls have much in common with the Theodosian rampart, and offer no new techniques. In particular, the defensive system of the ninth century walls near the Golden Horn closely resembles the Theodosian: it has a low outer wall with one or two levels of loopholes and battlements, and a high inner wall defended from its top and from the embrasures and platforms of its massive towers. The walls at Tekfur Saray and beneath the palace of Blachernae both resemble the outer Theodosian wall in having lower and upper defenses with loopholes and battlements; the former also had the protection of small round towers and the Theodosian ditch, while the latter was a high external wall. The only real peculiarity of these fortifications was the northern spur wall with its loopholes facing in opposite directions.

Major changes came under Manuel Comnenus whose walls represent an adaptation to new techniques of attack and defence. Although they bear a superficial resemblance to earlier work, it is clear that their size and shape have been fashioned for the crossbow and trebuchet. They are similar to earlier walls, however, in their use of towers of varying shape, and their two levels

of defence. The virtually contemporary tower of Isaac Angelus owes its distinctive character to its dual function as residence and fortification.

The whole circuit of the walls underwent further substantial change in the age of the Palaeologi.³³ The defensive zone of the towers of the inner wall was restricted to the platform as embrasures and loopholes were blocked; at the same time, inner chambers were partially filled to provide a heavier frame for the platform. Most of the work is undated. Alterations to the outer wall were more extensive, much of them carried out on a large scale in the fifteenth century when the circuit seems to have been in decay. In this project, the last effort to save Byzantium from the Turks, the curtain was largely rebuilt, and the loopholes apparently preserved, though some details, such as the casemates, were abandoned. The defensive chambers of the towers were also restored and, where necessary, new ones were built.

Similar changes affected the walls of the Blachernae. The curtain and towers by the Tekfur Saray were raised, and the gate and loopholes of the towers blocked.³⁴ In the wall of Manuel Comnenus, the upper sections of curtain and towers all consist of late repairs or rebuildings, many of which represent an increase in height. Here, too, loopholes were blocked. On the battlements, a new kind of crenellation appears with a loophole built into the merlons, an innovation which is also occasionally visible on the main Theodosian walls.³⁵ The residential tower of Isaac Angelus underwent similar change: the large windows of both parts were filled with masonry, and the crenellated platform of the northern addition raised.³⁶ The extensive modifications to the large ninth-century towers to the north seem to belong to an earlier phase than the work here described; these involved raising of the towers and partial blocking of the great openings which had connected the tower chambers with the wall-walk. These towers, however, appear to have been further raised, or at least repaired in the upper parts, under the Palaeologi.³⁷

In the same period, the walls came to have two separate fortresses or redoubts, in addition to the complex system already considered. At the southern end of the circuit, the Golden Gate, a large and complex structure, was rebuilt by John Cantacuzene in 1354 to become a separate keep or 'acropolis'.³⁸ In the opposite direction, the palace of the Porphyrogenitus (Tekfur Saray) was built over and surrounded by a fortification which may represent the adaptation of a pre-existing wall.³⁹ On its south and east sides, this wall displays machicolations, a feature which appears nowhere else in the Byzantine fortifications. At first sight, these appear merely to be supports for balconies, but their situation clearly indicates a defensive purpose, allowing the garrison to shoot vertically down at an enemy who had approached the base of the walls. Since the other sides of the palace were well protected by the ramparts, such a feature would be necessary only on the side facing the city. Machicolations were coming into common use in western Europe in the late thirteenth century; they may therefore be seen as another example of the western influence which the architecture of the palace represents.⁴⁰ Their location on the side facing the city suggests that the emperors of the day had much to fear from their own people, or at least from civil war.

The late and extensive Palaeologian changes represent a major rebuilding and redesign of the fortifications. Their intent was probably similar to that of the work of Manuel Comnenus. In general, the towers were made higher and stronger, and defence was limited to the platforms: these probably represent the introduction of the trebuchet, while some of the restorations of the outer walls could suggest that crossbows were employed there. Raising of the towers would give greater range and greater protection from enemy artillery and, in a late period, from the deadly Turkish bow. Although smaller and lighter than the conventional bow, this had tremendous power and range: a Turkish bow could shoot an arrow over 500 metres and could penetrate a plank more than a centimetre thick at 100 metres. The effectiveness of this weapon might have

encouraged raising of the ramparts and could perhaps account for the merlons with loopholes, a western innovation of the twelfth century.⁴¹ The changes could also have had a purpose of a different kind. Blocking of the loopholes and embrasures meant that fewer men would be required to defend walls which were far too long for the reduced town of the Palaeologi. Such limited resources would have been appropriate to the last stages of existence of the Byzantine state, when a small population still had to defend the vast circuit of the late antique walls, designed a thousand years earlier to protect a much larger city.

Some of the latest repairs reflect the dawn of a new age of warfare which Byzantium barely lived to see. Circular loopholes, a shape appropriate for guns, were built into several towers. By the fifteenth century, guns with long metal barrels, the arquebus and the culverin, were coming into general use: the last defenders of Constantinople were armed with some of them and had apparently provided their walls with suitable modifications to make them the only Byzantine walls which reflect the age of gunpowder.⁴²

It is clear that the defensive techniques of the walls underwent no significant change for most of the Byzantine period. In themselves, then, the techniques cannot be used to establish an accurate chronology although some changes may serve to associate particular walls and towers as part of the same project. To date the walls, other methods will have to be employed. The most obvious of these consists in the study of the numerous datable inscriptions of the walls; they are sufficient in numbers and precision to establish guideposts toward the dating of uninscribed walls. For more precision, analysis may follow the traditional method of identifying and comparing styles of masonry; or may operate more scientifically by studying the C¹⁴ content of the mortar, or by taking sections of the wooden beams and placing them in a known dendrochronological sequence.⁴³ The scientific methods will not be used here — there seem to be too few surviving beams for satisfactory dating of much of the circuit, and it has not been possible to collect the large sample of mortar needed for the C¹⁴ analysis. Recourse, therefore, will be made to masonry style and technique, recognising that the results may only be approximate. This method, however, will allow contemporary repairs to the walls to be identified, and will provide a conspectus of the kinds of masonry employed in different periods. It will also illustrate the problems and pitfalls with which the subject abounds. The discussion which follows will begin with towers and walls specifically dated by texts or inscriptions; it will then consider distinctive styles of masonry not so dated; and, finally, it will attempt to provide a chronology for these and a general view of the building styles and periods of the Land Walls.⁴⁴

MASONRY STYLES: DATED WALLS

The fifth century

413: [A]:⁴⁵ Although no part of the walls bears an inscription identifying it as the original work of Theodosius II, several sections which clearly belong to that period have been identified and analysed. They have important elements in common with most later phases of construction, but their masonry cannot be confused with another. These walls exemplify the shell construction which remained typical of Byzantine fortifications until a very late period: in this, an outer wall of 25–35 cm thickness was filled with a core of mortared rubble.⁴⁶ In earlier work, the rubble is usually well-sorted and densely packed. The other major characteristic common to this and later periods at Constantinople is the use of bands of brick. In the fifth century, these were composed of five courses of brick and run through walls and towers to provide a means of bonding the facing to the core and of consolidating the mortared rubble into separate massive layers. The facing consists of squared limestone blocks so well fitted together that the joints

are extremely narrow and often do not require mortar at all (fig. 3). This masonry follows the model of classical ashlar. As a rule, there are five or six courses of stone per metre, but some towers in the northern part of the wall use stones of twice the normal size, still well cut and laid. The brick bands are likewise carefully executed, with bricks 37 cm square and 4 cm thick; an average band is about 45 cm thick. For the most part, there are relatively few bands in earlier work, with five or six of them separated by nine to ten layers of stone, but the practice seems to vary considerably, especially in the northern part of the walls, for reasons which may be practical or aesthetic. The outer face, visible from afar and the first view a stranger would have of the capital, was constructed with greater care or aesthetic sense; the inner face often employs a far less careful arrangement of stone. This, too, is a phenomenon typical of the entire Byzantine period, and one which must be considered whenever chronology is discussed.⁴⁷

c440 [B]: The low outer walls, also a product of the reign of Theodosius II, differ considerably from the inner wall (fig. 3). Although they follow the same general pattern of several courses of stone alternating with bands of brick, the work is not so careful: the stones are often smaller and less well cut and fitted together, and the brick bands are sometimes replaced by similarly shaped bands of limestone.⁴⁸

447 [C1]: One tower, T16, has been attributed to the rebuildings occasioned by the destructive earthquake of 447. It has all the characteristics of the original work with large blocks laid in neat rows, brick bands each of five bricks separated by twelve courses of stone and running though the walls, and a postern. It differs, however, in using large square blocks which are evidently reused, set in a mortar with relatively narrow joints and numerous brick fragments.⁴⁹

The Dark Ages⁵⁰

c630: The wall of Heraclius at the northern end of the circuit offers few distinctive features. It shows in part the neat stone work of the Theodosian walls, but the number of bricks in the bands varies and some parts, which could be repairs, are in a far less careful style.

c685/715 [C2]: Two towers bear inscriptions in monograms from which the imperial name has been erased. One of these certainly named Justinian II (685–695; 705–711) and the other probably Artemius (711–715).⁵¹ The towers, T 40 and 46, are built in a similar style, distinct from that of the fifth century. T 46, with the inscription of Artemius, is of particular interest (fig. 3). The lower part, as far as the embrasures, is of finely cut and fitted limestone blocks with extremely neat brick bands. Although the inscription of Artemius is immodestly inserted among these blocks (so that it could be read from ground level), it is evident that the work is not of him but of Theodosius II, and even, perhaps, the finest example. The masonry of the upper part around the embrasures makes a clear contrast and introduces a phenomenon typical of the Middle Ages, the reuse of material. The blocks have less sharp edges and joints which are filled with mortar; the original squared stones evidently had fallen from the tower and been damaged so that they could not be reconstituted into a fine ashlar. Similarly, the bricks, set as usual in bands of five, are separated by wider joints of mortar; they too include reused fragments. This use of second-hand material, in many cases probably consisting of damaged stones and bricks from the very towers which were being repaired, is a constant feature of Byzantine work until the end. Tower 40, of Justinian II, is of similar construction to the upper part of T46.⁵²

➤ **740 [C3]:** Of the several towers which bear inscriptions in honour of emperors named Leo and Constantine, four may with some probability be attributed to Leo III and Constantine V and be taken to represent the repairs which they are known to have made after the earthquake of 740.⁵³ These are T34 and 37 with inscriptions in verse on bands of marble, and T18 and 25 which employ letters of brick. They all have in common a careful masonry of reused blocks with fairly

wide mortar joints (2–3 cm). Occasionally, small stones laid vertically fill a gap and lend variety to the masonry without, however, forming a pattern. The brick bands are also well constructed with mortar joints often equivalent to the thickness of the bricks; the bricks are set very close to each other within the courses. The arrangement of the bands varies, perhaps because established patterns were being followed: in T18, there are very few bands, each separated by eleven courses of stone, while in T25 bands are frequent, occurring after each five courses of stone (fig. 4). T37 displays a different pattern with bands becoming slightly more frequent toward the top, with two layers of nine stone courses followed by two of seven. In all cases, it appears that the alternation of brick and stone courses follows a regular, if varying, pattern.

775/780 [C4]: Inscriptions on T45 name Leo IV in conjunction with his son Constantine VI and his wife Irene.⁵⁴ The tower employs reused blocks fitted rather more closely together than those of the towers of Leo III, and brick bands with thick layers of mortar (fig. 5). Half the bands are separated by seven courses of stone, but the distance between the rest varies between four and nine, with the narrowest set of stone courses just below the embrasures. It is not clear that a regular pattern was intended. Another tower, T48, bears an inscription which probably names Leo IV and Constantine VI.⁵⁵ Its construction differs in no significant way from that of T45, except that the separation between the brick bands is more consistent, being of seven stones in most cases and once of nine. Three other towers, T47, 55 and 56 also name Leo and Constantine, without providing a means of choosing between Leo IV and Leo V who reigned forty years later.⁵⁶ These, too, have reused blocks well arranged in courses laid in a moderate amount of mortar, and bricks set close together with wide mortar joints in the bands. The brick bands are separated by five, six or seven rows of stone in no regular pattern. Towers 55 and 56 are so similar in every respect that they may be considered contemporary, but their masonry provides no obvious clue to assign them to one reign rather than the other.

815/820 [D]: The outer wall built by Leo V at the northern end of the circuit incorporated earlier buildings and has been so extensively restored that little of its original masonry survives. The section around the gate, however, seems to date from the time of Leo.⁵⁷ It is built with small reused limestone blocks of varying sizes arranged in regular courses, periodically interrupted by bands of five bricks.

821 [E]: An inscription shows that the bastion at the southern end of the wall of Leo V was built by Michael II and his son Theophilus; another, fragmentary inscription gives the exact date.⁵⁸ This work is in a style quite different from any yet considered. It uses large rectangular limestone blocks whose length is two to five times their height, so well cut that some look as if they were made for the purpose (fig. 6). Closer inspection, however, shows that they are spoils. Most appear in layers of three separated by bands of five very closely set bricks with exceptionally wide mortar joints. Near the top is a single row of stone with sufficient brick surviving above it to suggest that superstructure was entirely of brick. There is also a single course of stone near the bottom with a band of only four bricks above it. The lowest part employs far smaller blocks, like those of the wall of Leo V, with an occasional small squared stone set in vertically. The loophole of the western face is surmounted by a block carved with a rounded niche to form the top of the loophole and bearing a cross in relief on either side of the opening.⁵⁹ Although the masonry of this bastion is notably different from that of the Theodosian walls, it preserves the idea of alternating bands of stone and brick.

826/842 [F]: The three large polygonal towers of the Pteron, the inner wall at the northern end of the circuit, are identical in style and evidently part of the same building project.⁶⁰ A fragmentary inscription in marble letters on the southernmost, B15, shows that they were built by Theophilus.⁶¹ These also display a style not previously encountered (fig. 7). The lower parts consist of large limestone blocks of varying sizes set in mortar in regular rows. In some cases, parts

of the blocks have been cut away so that they will fit with their neighbours, and sometimes two smaller blocks have been laid flat to fill the space of one larger one. In all cases, seven courses of stone are separated by seven bands of brick. The superstructure is entirely in brick set somewhat apart in slightly irregular, though parallel, courses, with mortar joints as thick as the bricks. The lower part of the brickwork is decorated by a marble cornice which is separated from the uppermost stone course by a volume of bricks equivalent to two bands. Large crosses in brick adorn the southern tower above the level of the embrasures. The superstructure of each tower has been extensively rebuilt. These towers, like the bastion of almost contemporary date, make use of a large proportion of brick, but still preserve some notion of stone masonry with bands of brick. This style is not confined to walls built in the ninth century but also appears in the Theodosian circuit. A long stretch of wall between T81 and 89, in the vicinity of the Gate of Adrianople (Edirne Kapi) is built in masonry almost identical to that described, and displays on its one surviving tower, T86, a marble cornice in the brick superstructure (fig. 8). This wall has been assigned to the ninth century by its similarity to the towers of the Pteron; it may, in fact, be dated precisely by a fragmentary inscription, now lost, which bore the date 826/7 and stood on the left side of the Edirne Gate.⁶²

The Macedonian Period

868/877 [C5]: The first tower of the land walls, which stands at their junction with the sea walls on the shore of the Sea of Marmara, bears an inscription in honour of Basil I and his son Constantine.⁶³ The lower parts of the tower, with its base of exceptionally large stones designed to protect it from the sea which then reached its foot, is of the fifth century, the rest plainly medieval. The later masonry contains the usual reused limestone blocks separated by bands of five bricks with wide mortar joints (fig. 9). The brick bands are more frequent in the upper parts of the tower, where there are as few as four courses of stone between them, but there appears to be no regular alternation of brick and stone. The stonework displays a novelty in its use of exceptionally thin stones, about half the normal width, which sometimes form a double course equivalent to and replacing a single course of larger stone, and sometimes are set in a single course running across the whole face. Otherwise, the tower is quite similar to those of the eighth century. Tower 5, with a fragmentary inscription of the same emperors, appears to be of a similar style, with an increasing number of brick bands toward the top; much of its upper part, however, is of a late restoration. A further inscription of Basil and Constantine appears on T35; because of the slightly different shapes of its letters, it has only tentatively been assigned to Basil I rather than Basil II, who reigned a century later. Considerations of style suggest that the attribution is correct, for this tower, also, makes use of more frequent brick bands in its upper parts, and has small flat stones in many of its courses. It is, however, distinguished by a marble cornice which runs just below the embrasures.

945/959 [C6]: An inscription in brick letters on T57 names Constantine Porphyrogenitus, naturally identified with the well-known emperor Constantine VII, who proudly assumed the title after the deposition of the usurping Romanus I and put it on his coins during the period when he reigned alone or with his son Romanus II.⁶⁴ The inscription has also been attributed to Constantine VI, who is known to have been born in the purple room, on the grounds that its wording and brick letters have more in common with his inscriptions.⁶⁵ In general, the style of the tower closely resembles that of the other medieval towers considered, with reused stones and bricks with wide mortar joints (fig. 10). It differs, however, in two respects: the size of the stones, and the arrangement of the brick bands. The masonry makes extensive use of small rectangular stones, most of them laid lengthwise, but some, much smaller, set vertically. The result is a profusion of stone courses among the brick bands, which themselves appear at distinctly

irregular intervals, separated by as few as four or as many as thirteen courses of stone. It has, in addition, a stone cornice above the embrasures. This work seems sufficiently distinct from that of the eighth century to suggest that the traditional attribution is correct. Another tower, T24, once had an inscription in brick which apparently named the same emperor.⁶⁶ Its lower part offers the peculiarity of being composed entirely of huge marble blocks, one to two metres long, arranged in even rows interrupted by the usual brick bands with rather thick mortar joints. The upper part of the tower has a rather mediocre masonry of small and somewhat irregular stones. Five to ten courses of these separate the brick bands. A marble cornice runs below the embrasures. Small stones, cornice and the irregular separations suggest that this tower is contemporary with T57, and that the evidence of a varnished (and amended) inscription may be accepted.

959/963 [C6]: Tower 4, inscribed with verses in honour of Romanus II, offers no distinctive peculiarities, and appears to be built in the same style as the preceding.⁶⁷ It has the usual marble spoils and brick bands with wide mortar joints, and its stonework makes extensive use of small squared stones.

1028/1034 [G]: According to a surviving inscription, the tower B19 at the north end of the wall of Leo V was called the tower of Saint Nicholas and was rebuilt by an emperor named Romanus, evidently the third of that name.⁶⁸ The rebuilding affected only the upper parts, where the tower was added onto the already existing embrasured bastion. The addition, like the (undated) original, shows an alternation of brick bands and courses of stone, all of it much cruder than anything considered so far. The stonework displays many small pieces of varying shape, some mere lumps, in its rather desultory and uneven coursing (fig. 11). The brick bands, of four and six bricks, are likewise irregular and contain many fragments. In addition, bricks laid horizontally form partial courses among the stones. This work is clearly a new style, and the presence of extra bricks suggests a late date and hence the attribution to Romanus III.

The Comneni and Angeli

c1160/1180 [H1, H2]: The walls around the palace of the Blachernae, known from historical sources to have been built by Manuel Comnenus (1143–1180) have two distinct sections, each with its own style of masonry.⁶⁹ The southern walls, along with the massive towers of various shapes with which they are bonded, display a kind of banded masonry quite distinct from the Theodosian. In this section, from tower B1 to B9, bands usually consisting of seven bricks separate two, three or four courses of stone (fig. 12). The bricks are set with small gaps and a mortar joint roughly equivalent to their thickness. Towers usually contain six or seven such bands which, except for the topmost, continue into the adjoining walls. The stonework most clearly defines the difference between these and earlier walls: limestone blocks are usually much larger and arranged in a different fashion. The stones are often 40–60 cm high, roughly sorted by size and set in somewhat irregular courses in which two small stones will often fill the place of one large one, and where a whole course is sometimes composed of stones set on their narrow end. Often, larger stones are used in the lower parts of towers and walls, with smaller stones above, but it is not uncommon for a row of small flat stones to be set elsewhere, particularly above or below a brick band. Most of the stones, which are evidently all spoils, are rectangular or square, but an occasional column drum or moulded architectural fragment appears. For the most part, brick and stone appear to be separated, as in earlier walls, but in fact, many gaps between stones are filled with bricks inserted vertically and covered with a red-dish mortar which rendered them invisible. Most bricks appear to be reused.

This masonry appears consistently in the outer face of the walls. The interior of the towers, however, as well as much of the inner face of wall and towers, has a strikingly different aspect.⁷⁰

Although these areas use the same system of alternating bands of stone and brick, the stones are far less well arranged, with a mixture of large and small pieces of varying shape leaving many gaps to be filled with pebbles and mortar. Most notable is a far more extensive use of brick, with extra single or double courses inserted between each row of stones. These were evidently added as levelling courses to compensate for the irregularity of the stonework. Occasional bricks are also inserted vertically without forming any regular pattern. The interior of these towers sometimes makes use of recessed brick and has holes to show that wooden beams were on occasion used for additional reinforcement and to provide better bonding between facing and core.

Since the two types of masonry occur in the same walls, there is no reason to doubt that they are contemporary. They thus seem to represent an extreme form of a phenomenon already noted – that greater attention was always paid to the visible external face of a wall than to the interiors and inner face. The explanation of the difference is probably practical as well as aesthetic: that good spoils were available in limited quantities and were therefore reserved for the inside; and that the remaining stones, being too rough to be laid one on another, needed the addition of brick levelling courses and extra mortar in order to form the horizontal bands which were felt to be desirable.

The incongruity between the parts of this wall helps to explain the difference between it and the northern section, which consists of the square towers B9–12 with the adjoining curtain. The difference is immediately apparent at the joint between the two sections (fig. 13): the northern wall uses far smaller and less regular stones, its brick bands are more numerous, and it has additional single courses of brick alternating with each layer of stones (fig. 14). This section also makes extensive use of wooden beams and of recessed brick. Its brick bands at first sight seem to consist of four rows of brick with an exceptionally wide mortar joint; in fact, the mortar conceals an additional four rows of brick, so that the bands consist of eight rows of closely set bricks. As in the southern wall, most bricks appear to be reused. The brick bands also conceal the beams which were frequently used here for bonding. The inner face of this wall is virtually identical with the outer. The general style of these walls is more colourful and exuberant than those of the southern section, but also less well defined and further removed from the original system of Theodosius. Although this is still banded masonry, the effect is greatly diluted by the presence of the extra brick courses. Technically, these walls and towers were not much different from the others and, it appears, were virtually as strong: they have survived almost a thousand years of natural disasters, and did not constitute a weak point during the final siege of the city.

These walls are of such strikingly different appearance that they were formerly supposed to belong to widely separated periods. Good evidence exists, however, to show that they were contemporary. First, the northern walls continue the line of the southern and in no place constitute an obvious rebuilding of earlier walls. If they were of much later date, the defences of the Blachernae would simply have stopped at mid-point, leaving a large area unprotected. Further evidence comes from the wall which joins the first tower of Manuel with the Tekfur Saray. For most of its course, it has masonry almost identical with that of the northern wall, using brick bands separated by alternating rows of stone and brick. The bands contain seven courses of broken brick; the intervening masonry has single courses of brick alternating with a very rough stonework which has much brick filling. In the lower parts, which have been better protected from the elements, a great deal of mortar covers the surface to give a smoother appearance without, however, producing regular courses of recessed brick. The western end of this wall appears to be bonded with the first tower of Manuel. Most of the joint is obscured by a coat of mortar, but the bond is evident toward the top of the wall. The upper part of tower B1 similar-

ly has some extra brick courses in the context of smaller stonework, much smoothed over with plaster; the usual large blocks reappear above the topmost brick band. The connection of wall and tower leaves no doubt that the two are contemporary, and strengthens the association between the north and south walls.

There seem to be various possible explanations for the difference between what are evidently two parts of the same wall. Perhaps the masons of the northern section simply ran out of large spoils and began to use the smaller stones which needed levelling courses; or the gang working in the north had access to fewer ruined buildings; or the northern walls were separated by a sufficient lapse of time from the southern (though both still dating from the long reign of Manuel) that changes in aesthetic permitted what had been hidden to be displayed. In any case, their use of an extensive and often attractive brick work, along with the recessed brick technique, shows that they were not a product of inferior workmanship.

The style of Manuel Comnenus thus appears to be dual: a banded masonry with large blocks sometimes roughly set together, and an exuberant masonry with extra brick courses, smaller stones, and recessed brick. Because of the similarity of both to the masonry to be discussed next, it would seem that the walls date to a later rather than an earlier period of the reign of Manuel.

1185/1195 [H1, H2]: Two adjacent towers represent the work of Isaac Comnenus: B13, dated by an inscription, and the southern half of B14, known from an historical text.⁷¹ Both exhibit a variety of styles similar to those of the walls of Manuel. The smaller, only partially preserved, tower B13 employs stone courses and brick bands, with many extra brick courses. The stones, all small, include many fieldstones and pebbles as well as spoils; the frequent gaps are filled with mortar, pebbles and broken brick (fig. 15). Each crude row of stones is separated by a brick course which is sometimes doubled to compensate for the varied size and shape of the stones. In the lower part, bricks are inserted vertically to form a sporadic cloisonné whose function seems to have been to ensure equal spacing between the brick courses. The brick bands, placed at regular intervals, were of seven bricks each, closely set with very thin mortar joints; since the bricks are reused and adjacent stones are of odd sizes, the bands actually vary in width. Some of the bands conceal beams; recessed brick is not apparent. This crude style strongly resembles that of the northern and inner walls of Manuel, and if more plaster survived on the surface, they would be almost identical; in fact, resemblances between this masonry and weathered parts of the walls of Manuel, especially those where the mortar covering the recessed brick has disappeared, is striking. Although B13 uses more brick than the walls of Manuel, it can probably be considered as an extension of them, with the intervening part replaced entirely in the fifteenth century.⁷²

The large residential tower B14 has much in common with the southern section of the walls of Manuel (fig. 16). Its facing consists of large limestone spoils laid in sections of three or four courses, separated by bands of five, six or seven bricks. The blocks vary considerably in size, but, as far as possible, are laid in straight rows. The brick bands, which are less consistent, have fairly wide mortar joints. Vertical bricks appear irregularly between the stones, often, but not always, covered with mortar. The masonry of the outer face of the tower is more carefully constructed than that of the sides and the north buttress, where poorly sorted stones, highly varied brick bands, and extra brick courses appear. Other peculiarities of the tower, such as the columns which project from its face, may be explained by its residential function. It seems probable that tower B13, which had a large window inappropriate for defence on its north side, and B14 formed part of the same project of expansion of the palace of the Blachernae.⁷³ By their differing styles of masonry, they illustrate the same phenomenon as the walls of Manuel: two distinctive styles used in the same period.

1197 [J1]: A lost inscription in bombastic verses recorded the reconstruction of the Gate of Adrianople by Alexius III (1195–1203).⁷⁴ Although most remains of the project have disappeared, a section of repairs to the ninth-century wall by the gate has been identified. This consists of small stones of varying size laid in courses separated by single or double rows of reused brick (fig. 8). It thus resembles [H2] without the brick bands.

The Palaeologi

c1261–1282 [K]: The construction of the addition to the residential tower of Isaac Angelus shows that it dates to a period after the end of the twelfth century, and its masonry reflects a new style which has not appeared before. This, too, uses courses of brick and stone, with the stones varying from large rectangular spoils to small broken spoils and fieldstones (fig. 16). All are laid in single courses separated by a number of bricks which varies from one to five in a complex, rhythmical pattern: three courses of one to five bricks are followed by one of five.⁷⁵ The bricks are reused and set with wide mortar joints which display diagonal pointing. There are very few vertical bricks; round beam holes are common. In this style, which appears to resemble that of Manuel and Isaac, the idea of banding has almost disappeared, to yield to a complex play of elements. Its plainly decorative effect, which seems to arise from no practical necessity, differs from any style so far considered. The architecture shows that the addition is later than the end of the twelfth century; the style suggests a date in the reign of Michael Palaeologus, who is known to have restored the walls.

1432/1441 [L]: Numerous towers of the outer wall and one section of the inner wall bear inscriptions commemorating the last great series of Byzantine repairs, carried out by John Palaeologus in anticipation of the attack which finally came after his death.⁷⁶ The latest stands on the walls of the Blachernae between towers B13 and B14 (fig. 15). The masonry in all cases is virtually identical, and represents a departure from the usual Byzantine style. It has neither brick bands nor courses, but only small stones set in regular rows without any attempt at decoration. The stones are usually rectangular spoils laid as closely as possible, with the gaps filled by bits of broken brick. Work on the towers tends to use less regular stones and more brick fragments, while that of the wall is more neatly executed, with a large number of small round beamholes arranged at regular intervals. This masonry is so common in rebuildings of walls and towers throughout the circuit that it is difficult to consider all such repairs as the product of one desperate and impoverished period; the style may rather be one which was already in use for a considerable time.⁷⁷

1438 (?) [J1]: A marble plaque in a niche on the north side of T35 adjacent to the Gate of Selymbria records a repair to the gate by John Palaeologus. The stone stands amid masonry in which square and rectangular limestone blocks form regular courses with occasional fieldstones (fig. 17). In the area of the inscription, there is a single or double course of reused, fairly thick brick between each course of stone; vertical bricks are occasionally inserted. This masonry continues around the tower, becoming less regular with some brick courses missing and some doubled. Its style seems so uncharacteristic of the period that the inscription has been considered as a spoil and thus irrelevant to the dating.⁷⁸ It does, however, fit perfectly into the niche which obviously belongs with the masonry. The problem seems to have two possible resolutions: either the inscription was set into an earlier wall to commemorate specifically the restoration of the gate (which has since been completely altered) and not the tower; or that the late Palaeologi, like their predecessors, used more elaborate work at gates than elsewhere. For the moment, there seems no obvious means of choosing between these.

Conclusions

This survey of dated masonry, which necessarily deals with only a small number of walls and towers, reveals two significant if contradictory aspects of Byzantine style: *The force of tradition*, and *the love of variety*. In the long circuit of the Theodosian walls, the same style of banded masonry was followed for half a millenium, and so closely that, at first sight, it is difficult to distinguish work of the fifth from that of the tenth century. A closer view shows that the early masonry is distinguished by well cut stones set in little or no mortar — a development of the classical ashlar — while that of the Dark Ages has reused material with necessarily wider mortar joints. Between the seventh and the tenth century, an evolution appears in which the stones become smaller and the brick bands less regularly arranged; but from the beginning through the tenth century, the basic principle is followed, and the original work imitated with some care. Mere similarity of style, therefore, can be deceptive: masonry must be seen in the context of the surrounding walls and in the light of the local tradition. In this case, the tradition appears not to have been consistently abandoned for 500 years or more. It affected, however, only the Theodosian walls, with the ninth-century walls around the Gate of Adrianople forming the only obvious exception. The walls at the northern end of the circuit diverge further from the tradition: those of Heraclius and apparently of Leo V follow it, but the walls of Michael II are notably different. The walls of the Blachernae, built by Manuel Comnenus, though still in banded masonry, illustrate the second aspect, the love or tolerance of variety. Their two parts, seemingly so different, are evidently of the same date, and show that consistency was not always sought. Certainly, the inside and the outside of the walls had always exhibited differences; but now, the less elegant inner masonry was allowed to appear on the normally more careful outer face. This phenomenon reveals a major problem which analyses based on masonry styles must face: that stylistic development in a straight line is rarely to be found in the monuments, and that widely differing styles may be the products of the same age. The Comnenian walls, however, even with the addition of much brick and the use of less careful stonework, still follow the tradition of banded masonry. Its last traces are visible in the addition to tower B14 probably built by Michael VIII; thereafter, banded masonry seems to disappear and yield to a new development, plain undecorated stonework alien to the normal conception of Byzantine stonework in the capital.

An analysis of dated masonry should make it possible to study some parts of the wall which do not have inscriptions and are not mentioned in the sources. In some cases, a dating by analogy might be attempted; in others, it will suffice simply to point out the existence of a style and to examine its context in the hope that the evidence of adjoining masonry might help to establish a chronology. Any conclusions which such examination might produce will help to modify or expand those already suggested. The towers and walls which follow represent a selection from the material which deserves to be studied. A more comprehensive treatment would most appropriately be associated with a complete survey of the land and sea walls to extend and refine work which has already been published.⁷⁹

MASONRY STYLES: UNDATED MASONRY

Several sections of undated walls and towers will be considered below, roughly in the order in which they appear, from south to north. Many have not been noted or analysed. Each section will be discussed in its immediate context, with any chronological indications which that might give, and multiple occurrences of the same or similar masonry will be grouped together. To facilitate analysis, each style will be assigned a letter.

T33 [M1, C9]: The upper part of the west face of this tower, adjacent to its single embrasure, is decorated with brick in a cloisonné pattern (fig. 18). This shows considerable variation, from

the neat brick rectangles around the large stones to the right of the embrasure, to the mere insertion of small vertical bricks without accompanying horizontal courses in the narrow rows of stone [M1]. Most of the horizontal courses are single, one is double, some are lacking altogether. The bricks are thin and reused. This appears above a large section of banded masonry of the 'Theodosian' type, with reused brick and stone [C9]. The bricks are thin, and roughly laid in much mortar. In one band, there are five bricks, another appears to contain only three; both bands contain additional bricks or brick fragments concealed by mortar, but not in a regular recessed brick technique. The stones are mostly rectangular cut spoils in much mortar, some set in very thin courses; most of them are larger than those of the cloisonné. Banded masonry and cloisonné alike represent an earlier stage of the tower of which a large part, apparently ruined by an earthquake, was replaced in the plain 'Palaeologan' stonework with brick fragments in its joints. The interior of the tower likewise has evidence of different periods. A brick band over the postern entrance uses diagonal pointing, and an inner strengthening wall is in rough bricks set in a great deal of mortar.⁸⁰ A relative chronology may be determined from the context, which shows that the cloisonné is evidently later than the 'Theodosian' masonry and earlier than the 'Palaeologan'. Since the former consistently employs small stones in its courses, it probably falls late in the Theodosian sequence, perhaps in the tenth century or later. Thin bricks are a common characteristic of walls of the twelfth and thirteenth centuries; the inner strengthening of the tower would be appropriate to almost any late period; and the use of diagonal pointing occurs in towers of Comnene and Palaeologan date.⁸¹ The cloisonné would thus appear to date between the tenth and fifteenth centuries, and quite probably to the twelfth or thirteenth.

W 41/43; T58, W58/59, T59; T95; T96 [J2]: Several sections of the Theodosian wall are in a kind of masonry so similar that they may best be considered as a group. In W 41/43, immediately north of the third military gate, the wall makes an unexplained bend inward and has been repaired with an alternation of brick and stone courses (fig. 19). A single row of spoils and fieldstones, often very rough, is set in a great deal of mortar. Between the stones appears a varying number of brick courses, consisting usually of a single row of long bricks closely set, with one or more rows of fragmentary brick beside them. The better preserved section of this wall shows that the broken bricks were covered with mortar, as was most of the other work. Originally, therefore, a single row of brick would have appeared to alternate with a single row of stone set in a thick band of mortar. This seems related to, but is not identical with the recessed brick technique which employs a regular alternation of covered and exposed brick courses. In one place, a double band of ten brick courses seems to form part of the same masonry. It employs broken brick set in a good deal of mortar. The facing displays a large number of small round beam holes immediately above rows of exposed brick. Sections where the facing is missing reveal bands of broken brick which continue some distance into the core; these belong with an apparently earlier facing of 'Theodosian' style in which the small uncut fieldstones barely form courses. Neither masonry bears any indication of a date.

The upper part of T58, much of the wall between it and T59, and the whole south face of T59 are in a masonry extremely similar to that of W 41/43. In T58, spoils of varying size, most of them squared, are laid in regular courses separated by rows of brick; the brick courses are basically single, but some are doubled where additional bricks have been added to compensate for the use of smaller stones. Vertical bricks are not employed, but the gaps between stones are often filled with brick fragments. Occasional small round beam holes are visible in the brick courses. This masonry only differs from the preceding in its slightly more regular stonework. It is built above, and as a repair to 'Theodosian' work in which spoils are set rather roughly in mortar, with occasional fragments of stone and brick to fill the interstices. Its irregularity

and frequent use of small flat stones suggests a date late in the sequence of banded masonry.

The stonework of T59 and the adjacent wall is similar but differs in being much cruder, with mixed spoils and fieldstones of varying sizes; the brickwork is more abundant (fig. 20). Double and triple courses of brick seem to appear, but actually there is one main course of brick between each row of stones, and an additional filling added parallel to the courses to compensate for the gaps left by the inconsistent size of the stones. In the upper part of the tower, the masonry seems to be much different, with a single brick course regularly appearing. This, however, is the result of a plaster coating, here preserved, which covers the extra brick and much of the stonework. The original aspect of this masonry appears inside the tower, where it has been protected from the elements (fig. 21). In this, plaster covers all irregularities, so that a smooth face of stone in mortar alternating with single courses of brick appears. Small round beamholes are manifest in every third course of brick. The side of the tower built in this style seems to be all that survives of an earlier phase; the rest is in the plain 'Palaeologan' masonry which here may be associated with a rebuilding of the adjacent fourth military gate. These examples, too, provide no certain evidence of a date, beyond a general range: they are later than late banded masonry, and earlier than the plain style.

The south wall of T95 represents a repair built onto a tower in an original Theodosian masonry which features abundant brick bands — there are 13 of them — separated by three, four or occasionally five rows of stones. The repair has single or double rows of brick between single courses of mixed spoils and fieldstones. A coating of plaster produces a smooth surface between the rows of brick. This differs from the preceding in that it is much less neat than the interior of T59 and uses very little broken brick as filling. Above it, a later repair employs plain coursed stones with small bits of brick as an irregular filling. T96, which has similar masonry as part of a complex series of repairs, will be considered below.

T54 [C4]: This square tower bears a prayer for the city inscribed in letters of brick. It occupies a prominent point on a rise in the middle of the circuit, of which it may be considered the central point; its apotropaic inscription, which asks Christ to guard the city undisturbed and unconquered and to grant victory to the emperors, was apparently intended as a prayer for the whole wall. The tower is built with well-cut large spoils set in a moderate amount of mortar; a course of thinner stones occasionally adjoins a brick band. The stone courses are grouped in sections of five to eight in no regular pattern, except that the sections tend to become narrower toward the top. They are separated by the usual bands of five closely-set bricks whose mortar joints are as wide as the bricks. The inscription appears in the second brick band above the embrasures, halfway between them and the top of the tower. Above it, crosses of brick were set under small brick arches on each side of the tower. The masonry of this tower appears to be identical to that of T56, which also has a cross in brick under a small brick arch. The two towers may therefore be considered contemporary, and T54 thus assigned to Leo IV or possibly Leo V.

W59/60 [M2]: Part of this wall adjacent to the north side of T59 is decorated in a rough cloisonné where several stones are surrounded by broken brick (fig. 22). In other parts, there are horizontal bricks only, and occasionally single or double vertical bricks without horizontal courses. All this is in the context of 'Palaeologan' masonry in which spoils and fieldstones form straight rows leaving many gaps to be filled with brick fragments.

W 70/71 [J6]: This masonry resembles that of [J2], with alternating bands of brick and stone in straight courses (fig. 23). The stonework varies from well-sorted cut spoils to an irregular mixture of broken fieldstones; the brick consists entirely of fragments in single or double courses. Sometimes, a brick course runs for only a short distance, or is omitted altogether. In this, and in the lack of a clearly defined single course of brick to alternate with the stone, this

masonry differs from [J2], of which it appears to be a less careful version. Beam holes appear sporadically, and then in the stonework. It is not evident that the stones were intended to be covered with a coating of plaster. The context of this wall offers no material for dating.

W 73/74 [J3]: This resembles [J2] and is closely related to it except for some particulars: the stone courses are of a more varied width, the bricks are thicker, and the finished appearance would have differed in allowing some double rows of brick to stand out between the plastered stonework (fig. 24). Beam holes are not in evidence. The wall contains no evidence for dating.

T78, T96 [J4]: The south wall of T78 is a repair to an original Theodosian structure which displays a base of exceptionally large spoils and an abundance of brick courses separated by only two or three rows of limestone blocks.⁸² The repair is in an alternating brick and stone masonry, with small stones of all shapes separated by single courses of broken bricks. Gaps left by the varying stonework are filled with brick fragments, often several small pieces laid parallel to the courses. Brick and stone alike appear to have been covered with a coating of plaster. Beam holes, mostly small and round, but with one large and square, appear at regular but widely separated intervals. Its context shows only that this masonry, with its exceptionally narrow courses, is later than the fifth century. T96 will be discussed below.

W 79/80 [M3]: This wall, whose context provides no chronological evidence, makes extensive use of brick in an irregular and desultory fashion (fig. 25). In some parts, single courses of brick appear among the stones; in others, bands of three or five bricks run a short distance. In all cases, the bricks are fragmentary. Regular bands of brick are often omitted altogether, leaving a rough unadorned surface with a filling of broken brick. It would appear that the idea of masonry with a regular use of brick had almost disappeared.

W 80/81; T91, W 92/93 [J1]: W 80/81 uses a regular alternation of stone and brick courses in which most of the stones are squared and the bricks thick but evidently reused. In the lower part of the wall, bricks separate two rows of stone; in the upper, there is a regular alternation of brick and stone. The brick courses are all single, without any parallel brick filling. Vertical bricks are frequently inserted between the stones without forming a regular pattern. Small square beam holes appear at irregular intervals above every second row of bricks. The wall appears to have had a plaster coating which, however, seems not to have produced such a regular appearance as the interior of T59.

The lower half of T91, which is built over Theodosian masonry, shows a more regular alternation of single brick and stone courses. The bricks are thick, and almost invariably arranged in single courses, although an occasional double course appears, as do a few double courses of stone. Vertical bricks are sometimes used; beam holes and surface plaster are apparently absent. The upper part of the tower is in the plan 'Palaeologan' style, with brick fragments among the roughly coursed spoils and fieldstones. W92/93 is in the same masonry.

T96 [C7, J2, J4]: This tower features several stages of rebuilding (figs. 26, 27). The earliest part is in a banded masonry [C7] with relatively small spoils forming regular courses; broken bricks frequently fill the interstices. In some places, the brick fragments are laid side by side and almost form a course. The bands are composed of closely set bricks, and are notably straight and regular; mortar joints are somewhat narrower than the bricks. The bands are separated by seven, eight, or nine stone courses in no evident pattern. The north side of the tower consists of a regular alternation of brick and stone courses [J2]. The thick and close set bricks produce a well defined coursing. A coating of plaster brings the stonework up to a smooth surface. Beam holes are visible in the lower parts within or just above the brick courses. It is apparent that this masonry is closely related to [J2], and may be grouped with it. The wall which continued from this face contained a gate in its lower part, with a passage above to give access

to the wall walk of the adjacent wall, connected to tower 96a and representing the modifications which here closed the Theodosian outer wall and provided protection for the area of the Tekfur Saray. The north face was later buttressed in plain stone masonry and rebuilt with a very poor stonework mixed with small brick fragments. The lower part of the south side of the tower was rebuilt in a different masonry in which extremely small stones alternate with single or double courses of brick, with plaster forming a band between the brick courses. This is evidently type [J4]. Adjacent to it is a further repair in very rough stonework with numerous regularly arranged rectangular beamholes. Such beamholes appear in similar profusion in the walls of the Tekfur Saray and may indicate a Palaeologan date for this repair. On the other hand, all joints in the stonework are covered with a thick coating of plaster, a phenomenon supposed to be typical of the Turkish period.⁸³ Such plastering could, of course, be secondary.

Wall of the Tekfur Saray, with Towers 96a, 96b, 96c

This wall displays a complex series of rebuildings, with work of various periods (fig. 28). It begins at T96a, a large rectangular tower built in the size appropriate to the inner Theodosian wall, but occupying a place where a tower of the outer wall would be expected. It thus belongs to a time when this part of the Theodosian wall was abandoned and the new enclosure of the palace constructed. The tower has a base about five metres high of large spoils, on the average perhaps 75×50 cm., well cut and laid in regular courses. Most are laid horizontally, but some smaller stones are set on end to fill gaps; interstices are filled with small stones and brick. The superstructure is in the usual banded masonry, with five to seven courses of small stones between the bands, and with the frequent addition of small stones set vertically [C8]. Vertical bricks do not appear. The lower brick bands contain five bricks each; the upper four or three. In these respects, it constitutes a new variety of banded masonry.

The spur wall which connects the actual circuit of the Tekfur Saray with T96 runs behind T96a and is not bonded with it.⁸⁴ Its first stage seems to have had the same kind of masonry, with bands of three to five bricks and small stonework including narrow stones set vertically [C8]. It was rebuilt on more than one occasion; one of these involved the use of a banded masonry with recessed brick and additional brick courses between the bands, quite similar to the north section of the walls of Manuel Comnenus [H2].

The wall along the west front of the Tekfur Saray evidently underwent many rebuildings before the construction of the palace. In its original form, it used large blocks like those of T96a laid horizontally in courses, with a few stones set in vertically. This was interrupted at intervals now difficult to determine by bands of five bricks [E]. In the central and southern parts, the upper sections of the wall were rebuilt using a banded masonry where brick and stone courses appear between the bands and, in the topmost part, exclusive of them [J3]. This masonry may also be of the time of Manuel Comnenus; since it appears below the west facade of the palace, it is in any case earlier than the reign of Michael Palaeologus.⁸⁵ The situation in the northern section, below the broken facade of a part of the palace which has disappeared, is rendered more complicated by late rebuildings. These show that the lower part was as described, with large blocks; that the middle section had smaller stones with brick bands; and that the topmost part was of small coursed stonework without brick which may represent a section of the preceding to which a brick band has not been added. The elegant facade of the palace, with its fine masonry of single or double courses of stone alternating with triple courses of brick, typical of the style of the main palace, is built directly above the wall. This shows once again that the alternating brick is earlier than the palace, and also that there was here an earlier palace facade whose remains were incorporated into the Palaeologan facade. Its masonry, like that of the wall, has single or double courses of rather thick brick alternating with single courses of stone.

The semicircular tower 96b has three periods: in the earliest, three to five rows of well fitted large squarish blocks in somewhat irregular courses are separated by bands of five bricks with thick mortar joints [E]; the intermediate, which has alternating brick as described [J3]; and the upper, and latest, with rough small stones in irregular courses and a filling of broken brick (fig. 28). The top masonry is identical with that used to block the windows of the palace facade, and comparable to the late Palaeologan work [L].

The north tower, 96c, also semicircular, is obscured by the wall of Manuel Comnenus which abuts against it. It contains large well-fitted squarish and rectangular blocks with bands of four or five bricks in very wide mortar joints; the brick bands alternate with triple courses of stone [E].

Repairs to the wall of Manuel Comnenus

Most of the walls of Manuel have undergone repair and particularly raising at a time when coursed undecorated stonework was the normal masonry. In some places other styles are visible; these, since they are necessarily later than the twelfth century, may be of some value in determining the chronology of other parts of the wall. A few examples may be considered here.

The north side of tower B3 shows more than one period of repair (fig. 29). In one of them, small flat squared stones are laid in regular courses, and, in particular, they have been placed among larger blocks in such a way that they continue the brick band of the original work [M4]. In other parts, bricks appear among the stones to form an occasional cloisonné. The latest phase is represented by a crude patching of the brick bands in which tiles are set parallel, rather than perpendicular, to the surface. This phenomenon, which can be seen in various parts of the Theodosian wall, dates apparently to the Turkish period.

The wall between B5 and B6 has some distinctive repairs in which the brick bands of the original work are continued and imitated by bands of a different kind [M5]. These contain fewer courses and are entirely of fragmentary brick set in a great deal of mortar; the difference between the two is immediately striking (fig. 30). A kind of alternating brick masonry with broken brick also appears. It, too, is readily distinguished from the Comnene style by its desultory nature: the brick courses are irregular and soon turn into a mere scattering of brick fragments. Coursed stone with brick filling and an occasional trace of a brick band also appears in what appears to be a subsequent repair. Masonry similar to all these is found in tower B6.

W B13/B14

This section, probably the most highly decorative of the whole circuit, stretches only about twenty metres from the back of tower B13 to a square projecting bastion at the south of B14 (fig. 31). It uses extensive brickwork in an elaborate pattern of alternating brick bands and cloisonné [I]. The bands appear to contain five courses of broken and reused brick, but since the recessed brick technique is used here, there are actually several additional courses, all of fragmentary brick set close together, and mostly covered with mortar. The visible brick of the bands, like that of the cloisonné, is quite thick. The most unusual feature of this wall, not paralleled elsewhere, is the cloisonné in which fieldstones and occasional spoils are surrounded by a square or rectangle of brick. Where small stones are used, additional brick is inserted to fill the squares; much of this is covered with mortar. In its original state, with a full mortar covering, the wall would have shown a smooth face of wide brick bands and cloisonné. The technique differs from that of the adjacent tower of Isaac Comnenus by using thick brick, more regular bands, and more extensive cloisonné. Although the lower part of B13 also has some bands of cloisonné, they are more sporadic, more rectangular, and do not use brick filling. At

present, the relation between wall and tower is difficult to determine because much of the tower has collapsed, but a view taken some fifty years ago shows that the tower abutted against the wall.⁸⁶ Projection of the surviving parts confirms this, and shows that tower and wall were not structurally connected. The wall, therefore, may be considered to antedate the tower and, probably, to have joined the northern section of the walls of Manuel.⁸⁷ Repairs to it, which may have involved raising its height, are in the plain 'Palaeologan' style.

Walls below the Blachernae

The earliest stage of these fortifications, represented by the wall against which the rectangular chambers were built, employs a regular alternation of large reused blocks and bands of brick.⁸⁸ The bricks are thick, set fairly close in bands of five with wide mortar joints. Most of the stones are grouped in courses of three with occasional brick inserted vertically, but the topmost course is single and above it the superstructure is entirely of brick [E]. For the raising of the wall, a banded masonry was employed with courses of stones of varying width and bands of four bricks each. Some later repairs were made in irregular stonework with brick filling.

In the rectangular chambers, a rough masonry appears, with fieldstones in courses of four or five set in a great deal of mortar punctuated by triple bands of reused brick. A single course of brick, usually concealed by mortar, is often added between each row of stones. The mortar of the brick bands is chamfered [H3]. The masonry of the exterior, subject to weathering, gives an irregular appearance, with exceptionally rough stonework, and bands of brick set at odd angles (fig. 32). The bands are in recessed brick, with larger stones used in the exposed courses; some single courses of brick appear among the stonework. Masonry with more extensive brickwork appears to belong to late repairs which, here as elsewhere, are usually executed in plain stonework.

Wall of Leo V; Pteron

The original part of the wall of Leo V is too fragmentary to merit discussion, but the northern addition, with its loopholes along a vaulted passage, is quite well preserved.⁸⁹ It has four to seven courses of stone between bands of five bricks well set close together with narrow mortar joints. The stonework is composed of small squared limestone blocks in regular courses, some extremely narrow. In some places, small narrow stones are set on end to fill gaps and to give a more decorative aspect to the wall [C8]. The masonry of the Pteron appears to be identical: it has the same small stones, vertically set blocks, and bands of closely set brick [A2].⁹⁰ Actually, the stones of the Pteron are well cut and fitted together with very little mortar, and the joints of the brick bands are narrower than those in the wall of Leo V. These details seem to confirm the earlier observation that this is a wall of the fifth century; it thus appears to have provided a model for the adjacent wall.⁹¹

Repairs to Towers B15-B18

The upper parts of these towers have been extensively rebuilt. In B15, most of the work is in a recessed brick whose bricks are so closely set as to seem to form a continuous line, leaving a mortar band about twice the normal width [N]. A later repair is in regular plain stonework with a filling of broken brick, and much patching on the surface, especially on the northwest face, is in a rough and irregular brickwork. The upper half of B16 has been refaced with an alternation of single courses of stone with one to several courses of thin brick [J5]. Sometimes, a course of stone runs a short distance, to be replaced by brick (fig. 7). The upper part of this masonry was entirely brick, using thinner bricks with wider mortar joints than those of the

original face. Small round holes show that the new face was anchored to the old by wooden beams. In tower B18, as well as the others, there were also repairs in plain stonework.

ANALYSIS OF MASONRY TYPES (See Table I, p. 75-77)

The walls of Constantinople seem to present an exceptionally complicated range of masonry types. Although many may be considered as variations of relatively few types, the picture is still more complex than has been supposed. Without inscriptions or clear parallels, it will not be possible to assign a date to each masonry type to be considered, but most can be attributed to a period, and further research, if the walls are ever restudied as carefully as they deserve, will no doubt produce more precise results. For the moment, it will suffice to determine which masonry can be dated on the basis of its style, and to use this in turn as material for comparison with other fortifications. The undated material will be considered by type, beginning with the banded masonry.

Undated masonry with bands of brick and stone occurs in all parts of the walls. Indeed, only a minority of the Theodosian towers has actually been dated, but consideration of the rest is beyond the scope of this discussion, which instead will concentrate on four parts: T96, T33, T96a, and the Pteron.

The first of these [C7], being built of spoils, is plainly not Theodosian work, and it differs from any of the dated towers in its use of additional brick. It may thus represent a fairly late example of the banded style, tending toward the rather careless work [G] of tower B19. Although the tenth or eleventh century seems like a probable date for this masonry, a later period cannot be excluded since the well-established banded masonry could have been imitated for a long time.

The banded masonry of T33 is less careful than any other of this type, with its irregular courses of thin reused brick and mixed stone spoils set in a good deal of mortar [C9]. Its thin courses of stone are reminiscent of the tenth century towers, but the occasional bricks hidden by mortar suggest that imitation of the Theodosian style may have continued into a period when broken and recessed brick were in common use. The possibility that this tower is as late as the twelfth century, therefore, may be left open.

Tower 96a and the northern section of the wall of Leo V have in common the use of small squared blocks with the distinctive insertion of smaller stones set vertically. In this, the bastion seems to imitate fifth-century work found in the nearby wall of the Pteron, but the feature also occurs among somewhat larger stones in towers of 740 [C3], 950 [C6], and occasionally in the wall of the Tekfur Saray [E]. The bastion was built after the wall to which it was attached, and before the dated repair to it, that is, between about 820 and 1030. Tower 96a has a base of large squared blocks laid in a manner highly reminiscent of the towers of the Pteron, and quite distinct from the similar walls of Manuel Comnenus where much brick appears among the stones. It may therefore be assigned to the early ninth century and, since the superstructure gives no indication of being a later addition, the whole tower, and with it the bastion, assigned with some probability to the reign of Michael II.⁹²

Two other sections of wall in the same district may be similarly dated. The original parts of the walls and towers around the Tekfur Saray display large square or rectangular well laid blocks with brick bands in a technique evidently identical with that of the southern addition to the wall of Leo V [E], and may be considered contemporary with it. Likewise, the inner first stage of the walls beneath the palace of the Blachernae, with triple courses of large stones separated by bands of seven bricks, and a brick superstructure, is also in the same style. It, too, may be assigned to the reign of Michael II.

The extremely elaborate and regular cloisonné [I] between towers B13 and B14 occurs nowhere else on the wall.⁹³ It may be seen as a kind of banded masonry in which regular bands of recessed brick alternate with elaborate sections of cloisonné. A good deal of mortar evidently covered the rough parts of the surface to produce a smoother and more decorative effect than is now visible. In all its features, except the cloisonné, this resembles the northern walls of Manuel Comnenus, of which it probably formed a part. It was in any case constructed before the tower of Isaac Angelus which abuts against it, and its peculiarities seem not to appear in Constantinople before the Comnene period.⁹⁴ It seems to have been built as a section of the walls of Manuel, with an especially decorative aspect to direct attention to the palace which stood above it. It is probably significant that the other example of highly decorative stonework, the Palaeologan addition to tower B14, stood nearby; it may have performed a similar function.

The outer wall below the palace of the Blachernae, north of tower B14, is also in a style related to that of the Comnene walls [H3]. It has banded masonry with recessed brick and a very crude stonework among which an occasional extra course of brick appears. This structure is necessarily later than the ninth century wall which it blocks, and earlier than the tower of Isaac Angelus which in turn blocks its loopholes. It may belong to the time of Manuel Comnenus or, since it lacks the regular intermediate brick courses which seem characteristic of that, it could be an earlier version. It is in any case unlikely to antedate the age of the Comneni, since its features differ considerably from those of earlier dated banded masonry.

The recessed brickwork [N] which appears without stone courses in the repairs to tower B15 is perhaps to be associated with the same period. It is necessarily later than the original tower of the ninth century [E] and earlier than the undated raising. Since recessed brick seems to occur in these walls predominantly in the age of the Comneni, a date in the twelfth century appears plausible.⁹⁵

The most complicated masonry for the present discussion is the alternating brickwork which appears in many parts of the wall and presents a great variety which has not previously been noted or studied. It seems to present five major types, none dated.⁹⁶

In the first [J2], the stonework and much of the brick is covered with a coating of plaster which provides at the same time a smooth surface and a regular pattern, features which it shares with the cloisonné [I]. In some cases, where this masonry represents a repair or is itself repaired, a relative chronology can be suggested. On T58, it is later than stonework which resembles [C6] and on T96 it postdates [C7]. These indicate that it was in use later than the tenth or eleventh centuries; the other repairs show that it was earlier than the fifteenth; and the similarity with the cloisonné points to the age of the Comneni. A variety of this, [J3] in which the bricks are thicker and some double courses are left exposed, occurs only in an undated context.

The second type [J1], which appears in several places, differs from [J2] in lacking the coat of mortar. In some cases, this may have disappeared through weathering; in others, it seems never to have existed. This style has rather thin bricks in single or double courses, and offers curious chronological indications. A section near the Gate of Adrianople has been attributed to the reign of Alexius III (1195–1203), and in T91, similar masonry evidently preceded the 'Palaeologan' style. Tower 35, however, seems to be dated to 1438 by an inscription. The masonry of this tower is virtually identical with that of Alexius III, and other dated walls and towers of the fifteenth century are of a fundamentally different style. The date 1438, therefore, is notably incongruous with other evidence, and may be disregarded. The inscription was apparently set in an existing niche and in any case may be taken to refer only to the gate, rather than the tower in which it stands.

The other varieties appear less frequently. One of them [J4] employs extremely small stones in narrow courses; on T96, it is later than a banded masonry [C7] which may date to the eleventh century, and earlier than an undecorated stonework with many beam holes. The other two varieties, in which the regular pattern is only partially preserved, seem to represent a late form of alternating brick. The more elaborate [J5] uses very thin bricks in single courses or in bands of unpredictable width; on occasion, the stonework is entirely replaced by brick. This is used in the repair of a tower of the ninth century which apparently involved raising its height. Finally, in [J6] the idea of setting brick in bands seems on the point of disappearing: some bands run only short distances, none is well defined. This appears in a wall which offers no indications for dating.

The numerous varieties of alternating brickwork suggest that it was in use for a considerable time. It could have begun in the Comnene period, as congruent evidence seems to suggest; nothing would indicate an earlier date. In effect, it resembles the north wall of Manuel Comnenus without the brick bands, and the only dated section is of the late twelfth century. Its use could have continued well into the age of the Palaeologi; by the fifteenth century, it seems to have ceased.

The final masonry to be discussed consists of a group of repairs with an inconsistent use of brick which seems intermediate between the banded and decorative styles, and the plain stonework of the last Byzantine phase. The first of these, [M1], is used in the upper part of T33, where a few courses of cloisonné, some bold and regular, others desultory and fragmentary, appear above, and evidently as a repair to banded masonry [C9]. A later repair, apparently the result of an earthquake, is in the undecorated 'Palaeologan' style. This cloisonné has little in common with that of the Blachernae [I], where the brick is more abundant and decorative and the surface is smoothed with mortar. It seems almost a half-hearted attempt at decorative brickwork whose cloisonné often degenerates to a mere insertion of a broken brick, horizontally or vertically. It is later than the banded masonry, which may be of the twelfth century, and earlier than the fifteenth.

Cloisonné of a similar style appears in W 59/60 [M2], where the effect is more feeble and inconsistent. Brick surrounds some stones, but is elsewhere only scattered. This cloisonné forms no regular courses, but rather seems to represent a desultory attempt at decorating the plain late stonework. It is perhaps, therefore, to be assigned to the fourteenth or fifteenth century.

Masonry in which brick bands are treated like the cloisonné just described appears in W79/80 and in repairs to the wall between B5 and B6. In the former [M3], brick bands run for a short distance to appear and disappear unpredictably. The repairs [M4] have some bricks set in imitation and partial continuation of the original brick bands; they, too, are inconsistent. This work is necessarily later than the twelfth century. In style, it seems to resemble the cloisonné [M1, M2] and may thus belong to a similarly late period. The final version of this type [M5] appears in repairs to tower B3 and differs from the preceding in making use of thicker brick in its cloisonné and of small stones which replace and continue brick bands. It too is necessarily later than the twelfth century; the neatness of its execution is reminiscent of the wall between towers B12 and B13, built by John Palaeologus in 1441.

The masonry grouped as [M] all seems to represent the last stage of decorative brickwork at Constantinople. It gives the impression of imitating earlier styles, but of failing to carry out the work with any care or consistency, as if such techniques had long since fallen into desuetude and were barely thought necessary. It seems probable that these styles are products of the Palaeologan period, and contemporary of the plain stonework characteristic of that age, or at

least of its last century. The undecorated masonry itself is in need of more study than can be attempted here. Its widespread use, however, and the evidence of the sources which mention many repairs in the Palaeologan period, suggest that it was used for a considerable time, not limited to the dated repairs of the fifteenth century.

THE SEA WALLS

The massive and complex land walls of the capital by no means stood alone, but shared the defence with a somewhat simpler system of walls which lined the shores of the Golden Horn and the Sea of Marmora. Since these were in part protected by water, they formed a single rampart without an outer wall or ditch. Like the land walls, they have a complicated history, with many periods of repair; they also have several sections which may be dated by inscriptions or other evidence. They are, however, far more dilapidated than the land walls, and have never been surveyed in detail. Until such work should be done – if the rapidly disappearing traces will permit it – it is possible only to treat this system of fortification rapidly, concentrating on a few points of interest which may confirm or supplement the information gathered about the land walls. The present discussion will omit the walls of the Golden Horn altogether, since they are very poorly preserved and present problems of interpretation which cannot be approached here.⁹⁷ Likewise, the walls of the Marmora will not be treated in any detail, since appreciation of them would demand a complete study. Instead, this section will deal with some dated walls and towers whose masonry seems to repay study and whose remains are reasonably well preserved.⁹⁸ They will be considered in chronological order, and will reveal several kinds of problems.

829/842

The whole circuit of the walls along the Golden Horn and the Sea of Marmora was extensively rebuilt in a project which began under Michael II (820–829) and continued into the reign of Basil I (867–886). Numerous inscriptions, most of them now lost or removed from their original location, named the emperors of this period. The four which survive *in situ* bear the name of Theophilus, and present evidence for identifying masonry of his time, as well as illustration of the problems which even this seemingly straightforward material can offer.

The first inscription stands on a long projecting bastion just north of the Ottoman gate Odun Kapsı between towers 4 and 5 (fig. 33). It consists of a prayer in iambic trimeters written in raised letters on marble blocks which stretch some twenty metres along the face of the wall. They state that Theophilus built the wall new from its foundations, and pray that Christ preserve it until the end of time.⁹⁹ The wall, as far as the obviously restored crenellations, consists of a regular banded masonry in which seven rows of small stones alternate with bands of five bricks [C8]. In the lower part of the wall, the bands run above and below the loopholes, each of which was placed below a small brick arch.

In tower 5, whose inscription also proclaims it as the work of Theophilus, the masonry also has an alternation of bands of five bricks with seven courses of stone, but here the stones are larger and better cut. In one case, there are only five rows of stones, and above the embrasures where a brick band would be inappropriate because of the increased size of the stones, a row of very long rectangular spoils has been inserted.

The third inscription adorns tower no. 6, which has been so extensively patched that most of the original masonry has been changed beyond recognition. In the lower portions, however, enough survives to show that it resembled tower 5, with large blocks, regular bands of brick, and a course of fine spoils above the embrasures.

The final inscription of Theophilus appears on tower 16. This also bears, at a higher level, an inscription of Leo VI and Alexander dated to 906, to show that it was rebuilt within a century of its construction.¹⁰⁰ The masonry bears some resemblance to that of the previous towers, with seven courses of small stones alternating with bands of four or five bricks, and with small brick arches above the embrasures. It had a base, no longer visible, of large cut limestone blocks, no doubt intended to protect it from the force of the waves. The two inscriptions should make it possible to distinguish the masonry of the ninth from that of the tenth century, but in its present form, the west face of the tower, where the inscriptions are set, introduces a problem which could cause some confusion. Most of the masonry of this face is quite rough, with spoils and fieldstones barely set in courses in a great deal of mortar. Bricks appear seemingly at random, and brick bands are fragmentary. This is clearly different from the walls of Theophilus, and seems not at all what might be expected in the tenth century, although it seems certainly to be dated by the inscription. The two inscriptions, in fact, provide evidence of a different kind for the dating, since it is apparent that both are reused. Earlier discussions of the tower have noted that the last two words of the inscription of Theophilus are reversed. This leaves no doubt that it was reset at a time when Greek was in current use, when a cross might be put in a conspicuous public place, but when attention was no longer paid to the formulas used in these inscriptions. Similarly, the upper inscription, of Leo and Alexander, is also reused: it seems to begin in the middle of a word, and part of its text is missing. The two inscriptions, therefore, are of little value in dating the masonry in which they were set, except to show that it was later than the texts. In this case, then, few conclusions may be drawn about the masonry of the ninth century. The upper part may indeed represent the repairs of Leo VI, in which case he will have followed the style of Theophilus, with loopholes surmounted by brick arches; later rebuildings have obscured the original brick and stonework. On the other hand, Leo may have carried out a general rebuilding of the tower. In its present state, the tower cannot be associated in the usual way with the inscriptions; in all cases, therefore, the possibility of reuse must be considered.

These dated examples, especially the first, clearly reveal a definable ninth-century style which employs a regular alternation of stone and brick bands. The stones usually occur in rows of seven, and are most often small. Brick bands tend to be composed of five bricks. The first inscription demonstrates that this is original work of the ninth century, and that the walls and towers in question do not merely represent the rebuilding or modification of earlier defences. Excavations and surveys which have been carried out in a fairly large area behind towers 4–18 confirm this by revealing an earlier wall behind the structures of the ninth century. The masonry of these sections of the sea walls has much in common with contemporary parts of the land walls. The walls and towers of Michael II [F] have large stones laid in seven courses, and the original part of the wall of Leo V [D] used similar small stones. Most striking is the resemblance between the sea walls and the rebuilding of the Pteron [C8] whose masonry also occurs in T96a. This work has already been assigned on other grounds to the ninth century; the example of the sea walls may be taken to confirm the proposed date, and perhaps to suggest that the walls were rebuilt in the time of Theophilus rather than that of Michael II.

1164

According to a surviving inscription, T93 adjacent to Narlı Kapı near the western end of the circuit was repaired in 1164 by Manuel Comnenus.¹⁰¹ The text, inscribed on two blocks of marble, was inserted into a brick band at mid-height. The masonry of the tower employs bands of three to five bricks between a number of stone courses which varies from nine or more in the lower parts to five in the upper (fig. 34). The stones are generally small squared spoils with an occasional small piece inserted vertically; they have wide interstices which are filled with pebbles and a great deal of mortar. An occasional course is made of extremely thin stones [C10].

In general appearance, this tower closely resembles those of Theophilus, from which it differs in only a few details: the spacing of the brick bands, somewhat closer set toward the top; the presence of narrow courses; and the wide interstices between the stones. If the inscription had not survived, the tower would normally have been attributed to the ninth century. It may therefore serve as an example of the successful imitation of earlier styles as late as the twelfth century, and as a warning against facile attribution of masonry. It may also suggest that some of the styles of banded masonry already considered are later than suspected.

cl308?

An elaborately decorated facade with a fragmentary inscription in brick conceals tower no. 10 and forms the last stage of a complex series of rebuildings; it also illustrates further problems of this investigation. Three distinct walls have been found and carefully surveyed in this small area.¹⁰² The first stage is represented by a tower whose base of huge marble blocks (as much as 2m50 wide and 1 m high) joined by bronze clamps has been associated with the Roman walls of Byzantium. The superstructure is in banded masonry with three or four rows of well-cut limestone blocks alternating with bands of five new and carefully set bricks with intermediate mortar joints [A3]. This fine work has been attributed to Theodosius II, who had the sea walls built in 439. New fortifications built directly in front blocked these early towers and walls; the style of these suggests the activity of Theophilus.¹⁰³

In the final stage, this wall, too, was blocked by the structure now visible which at the same time formed part of the fortifications, and the substructions of the church of Christ Philanthropus (fig. 35). According to the investigators of the site, the facade should date to the time of Alexius Comnenus, even though the identification of the building with a church founded by that emperor was erroneous, and the existence of the present structure could not be traced back beyond the fifteenth century. Subsequent researches suggest that the facade was built around 1308.¹⁰⁴ It employs a complex masonry with extensive use of recessed brick which in the lower parts appears in bands of five alternating with rows of four or five courses of rubble set in a great deal of mortar and containing some extra courses of brick. The whole facade appears to have been covered with a great deal of mortar, which would have produced a smooth surface. In the upper part, the recessed brick ran continuously through the niches which decorate the facade, and is finally surmounted by an elaborate decoration of circles, lozenges and meander patterns. The fourteenth-century date, in my opinion, is confirmed by a comparison with the almost identical brick decoration of the south church at the Fenari Isa Camii, built around 1300. The exonarthex of that complex, also of the fourteenth century, makes extensive use of recessed brick.¹⁰⁵ The main archway of this facade was subsequently blocked with a kind of alternating brick masonry in which spoils and field stones form rough courses separated by single, double, or occasionally triple courses of brick. The whole seems to have been covered with a coat of plaster.

The dating of this facade is more certain than its relevance for the study of the walls. Although technically speaking it forms part of the fortifications, its complex decorative masonry, unparalleled in the whole circuit of the walls, is that of a church rather than a fortification. The most casual inspection of the churches of Constantinople will show that they are built with a far more careful and attractive masonry than the walls, and that their development is quite different. Although there are some striking similarities between church and city walls, the former have many kinds of masonry which do not appear in the fortifications. Even when churches and walls use similar styles, it is often not at all evident that they are contemporary. In general, therefore, the evidence of the churches is to be used with care; hence, they rarely appear in the present discussion. The facade of the sea walls may thus be taken as an example

of ecclesiastical architecture, and not used for the information it might be expected to provide about fortifications of the fifteenth century or later.

CONCLUSIONS

This discussion of the walls of Constantinople has revealed many of the problems with which any study of Byzantine fortifications has to deal and, I hope, will have provided some guide for their treatment both in the capital and in the other walls yet to be considered. The greatest problem, of course, is that of chronology, without which the walls may stand as monuments worthy of curiosity but capable of contributing little or nothing to the general knowledge of Byzantine architecture or history. When some dating is established, however, the remains may take their place among the material record of Byzantium and be used to illustrate historical and architectural developments. At Constantinople, this problem should be most easy to resolve because of the large number of dated towers; but, as the preceding study has shown, the situation is complex and the dating of most of the walls not at all evident. By analysis and comparison, however, some progress may be made and many sections dated, at least with some degree of probability.

As already noted, the techniques of fortification in themselves are of little help for dating. The system already developed by the fifth century was used without major modification into the twelfth. Technological innovations of that time, though, did leave their mark on fortress design as towers and walls had to be adapted to the new weapons, the trebuchet and crossbow. Such structural changes continued into the Palaeologan period and if found elsewhere should reflect a relatively late date.

The style of masonry employed in the walls has been of greater help in establishing chronology both relative and absolute, but has also provided some difficult problems. Here, too, the example of the fifth century was generally followed into the age of the Comneni, so that each section of banded masonry must be viewed with some care. Close inspection does reveal differences of style which may serve to distinguish walls of similar appearance. The power of example and imitation, therefore, should always be considered, especially when treating a section of wall with a well-defined style of masonry. At Constantinople, the whole long circuit of the land walls, as far as the Gate of Adrianople, was constantly rebuilt in the same style as late as the twelfth century. Here, the model of the Theodosian walls was thought worthy of imitation for some eight hundred years. The shorter section to the north, however, saw a different development in which a new style of masonry, still banded like the Theodosian, but with a notably different arrangement of brick and stone and with a superstructure of brick, made its appearance in the ninth century. Here, then, new styles could be introduced, perhaps because the main Theodosian walls never covered the region of the Blachernae, while the old style was being carefully followed a short distance to the south. Mere difference of style, therefore, cannot always be taken as indicating a difference of date, and each wall must be considered in its context.

The region of the Blachernae was the scene of further innovation under the Comneni when a new kind of banded masonry was used for walls which were adapted to the new techniques of defence. These Comnenian walls, like the neighbouring towers of the Angeli, introduce another complication: contemporary, and adjacent, walls and towers could be built in styles which seem to be quite different. They reflect an ancient difference between the inner and outer faces of a wall, a phenomenon which needs also to be borne in mind in such a study. In the final period of their existence, the walls of Constantinople underwent a fundamental change of appearance: the decorative brickwork used from the beginning was abandoned, and replaced by a plain stone facing. This tradition was taken up and generally followed by the Turks who, however, tend to

employ a rougher stonework than the late Byzantines. In any case, lack of brick would seem to indicate a late wall.

It is possible therefore to determine a general progression of styles, not an orderly one in which one style simply replaces another, but a complex development where old and new coexist in different parts of the wall or even side by side. By using towers and walls whose dating is relatively secure, it has been possible to suggest a chronology for many undated sections, which in turn may expand knowledge of various periods and indicate the extent of large-scale repairs. Increasing knowledge raises new problems. The undated masonry suggests that imitation of the original banded style may have continued into the twelfth century. It also shows that the restorations of Michael II and Theophilus were far more extensive than had been supposed, affecting the whole area from the Gate of Adrianople to the Golden Horn. This work may be connected with the well-known rebuildings of the walls along the Sea of Marmora and the Golden Horn to show that the ninth century was the most active period of reconstruction in the history of the walls. The rebuildings seem to have started on a relatively small scale under Leo V, developed greatly under Michael II, reached their height under Theophilus, and continued under Michael III and Basil I. Most of this was carried out in a distinctive style which differed considerably between the land and sea walls, with the final repairs to the southern part of the land walls in a banded masonry compatible with that of the fifth century.

In addition to the well-known walls of the Blachernae, the Comneni seem to have been responsible for the adjacent stretch of elaborate cloisonné as well as the banded masonry with much extra brick in the substructions of the palace. They or their immediate successors seem to have introduced the alternating brick style which strongly resembles the northern Blachernae walls without the brick bands. Although the chronological evidence is not very satisfactory, this style, which appears in many parts of the wall, appears to have been used well into the Palaeologan period. In spite of its widespread use, it seems hardly to have been noticed at Constantinople; its importance as a style of late Byzantine masonry will become obvious in the following chapter, on the walls of Nicaea.

Study of the numerous styles of rebuilding also seems to reveal a transition between the decorative brick styles of most of the Byzantine period and the plain stonework of the final ages. This is marked by desultory and degenerate forms of banded masonry, alternating brick, and cloisonné, all of which may be contemporary and are probably to be considered as Palaeologan work. These styles may fill the gap between the complex early Palaeologan masonry of the residential tower B14 and the plain stonework which was apparently in use for some time before its prominent appearance in the last years of the Byzantine city.

Although the sea walls deserve a detailed study which could not be attempted here, consideration of a few dated sections revealed new styles and further problems. The tower of Theophilus and Leo VI showed that even the most substantial evidence needs to be viewed carefully, since the inscriptions there are reused and reveal little about the masonry in which they are set. The tower of Manuel Comnenus showed once again that late masonry could imitate earlier with considerable success. Finally, the facade of 1308 reflected a phenomenon which is beyond the scope of the present discussion but needs to be borne in mind throughout the study: that the walls of churches and fortifications serve different purposes and are built in different styles, so that direct comparison is often difficult or misleading.

In spite of the numerous problems, analysis and comparison may produce results. With these numerous caveats in mind, a similar method will be applied to the study of the walls of Nicaea, which offer even greater complications.

TABLE I - CONSTANTINOPLE: MASONRY TYPES

TYPE	DATE	LOCATION	CHARACTERISTICS	ILLUSTRATION
Banded Masonry:				
A	413	<i>passim</i>	Well-cut squared blocks with narrow joints, regular bands of 5 bricks	fig. 3
A2	first half V c. (?)	Pteron	Small well-cut and fitted blocks; some vertical stones; brick bands with narrow joints	LKP II.62b
A3	439	Sea Walls, T10	3-4 rows of ashlar alternating with bands of 5 new bricks	Demangel & Mamboury, fig. 57 fig. 3
B	c440	Outer Wall	Blocks smaller, less well cut than main wall; brick bands sometimes replaced by stone.	LKP I.26
C1	447	T16	Reused blocks, neat work; 12 courses of stone alternating with 5 of brick	fig. 3
C2	685/715	T40, T46	Spoils with rough edges; joints relatively wide in stone and brick	fig. 4
C3	740	T18, 25, 34, 37	Spoils with wide joints; some vertical stone; bricks closely set; regular pattern of bands	fig. 5
C4	775/780	T45, 48, 47, 54, 55?, 56?	Well-fitted spoils; wide joints in brick bands, which are separated by 5-9, often 7 stones, not in pattern.	fig. 9
C5	868/877	T1, 5	Bands more frequent toward top; some courses of very thin stones	fig. 10
C6	945/959	T44, 57	Many courses with small stones, some vertical; irregular separation of bands	figs. 26, 27
C7	XIc (?)	T96	Small stones, much filling of broken brick; some fragmentary courses; neat brick bands	figs. 28, 33
C8	829/842	Sea Walls, T96a	Base of large spoils; much vertical stone; bands of 3-5 bricks	fig. 18
C9	XIIc (?)	T33	Thin bricks and small thin stones roughly laid in much mortar	fig. 34
C10	1164	Sea T94	Small squared stones, some in very thin courses; wide mortar joints	LKP II.59b
D	815/820	Leo V Wall	Small spoils, bands of 5 bricks	

TABLE I – CONSTANTINOPLE: MASONRY TYPES (Continued)

TYPE	DATE	LOCATION	CHARACTERISTICS	ILLUSTRATION
E	820	W 96a-96c, Blachernae, Leo V Wall	Large well cut blocks in layers of 3 separated by bands of 5 closely set bricks with wide joints; brick superstructure	figs. 6, 28; LKP II.58
F	820/829	T81/89, Pteron	Large square blocks well cut to fit; 7 courses each brick and stone; brick superstructure	figs. 7, 8
G	1028/1034	B19	Crude stonework, extra brick between stones	fig. 11
H1	c1170-1195	Blachernae	Large spoils, some on end, brick between; bands of 7 bricks	fig. 12, 13, 16
H2	c1170-1195	Blachernae	Small spoils; recessed brick; extra brick courses; many beam holes	figs. 13, 14, 15
H3	XIIc	Blachernae	Rough; bands of 3 bricks alternating with 4-5 courses of stone; recessed brick; chamfered mortar	fig. 32
I	c1170	B13/14	Elaborate cloisonné alternating with bands of recessed brick	fig. 31
Alternating brick				
J1	1197			
J2	XIIc (?)	W85/86, T35 W41/43, T58, W58/59, T59, T95, T96	Single or double brick courses; small stones	figs. 8, 17
J3	XIIc (?)	W73/74, W96a/96c	Single rows of stone and brick, brick filling between; surface covered with mortar; small round beam holes in brick courses	figs. 19, 20, 21, 26
J4	(?)	T78, 96	Thick brick; some double brick courses exposed	fig. 27
J5	XIII/XIVc ?	B16	Very small stone, single or double brick courses	fig. 7
J6	XIV/XVc (?)	W70/71	Single stone courses, varying numbers of bricks	fig. 23
K	1261/1282	B14	Small fragmentary bricks; complex alternation	fig. 16
Plain stonework				
L	1431-1441	<i>passim</i>	Rhythmical alternation of brick and stone	fig. 15
Late styles				
M1	XIV/XVc ?	T33	Small stones, neat; filling of broken brick	fig. 18
M2	XIV/XVc ?	W59/60	Irregular cloisonné with thin bricks	fig. 22
M3	XIV/XV	W79/80	Desultory cloisonné with plain stonework	fig. 25
M4	post-XIIc	B3	Irregular, desultory brick bands	fig. 29
			Small stones replace brick bands; irregular cloisonné with thick bricks	

TABLE I – CONSTANTINOPLE: MASONRY TYPES (continued)

TYPE	DATE	LOCATION	CHARACTERISTICS	ILLUSTRATION
M5	post-XIIc	B4	Bands with fragmentary brick in much mortar	fig. 30
Plain brickwork				
N	XIIc	B15	Recessed brick facing	LKP II.61

Nicaea

After the walls of the capital, those of Nicaea provide the most interesting and complex record of fortification in the Byzantine empire. Nicaea had a splendid history long before it was endowed with its present fortifications in the late third century, and flourished long after as one of the great cities of the Empire, attaining its greatest glory in the thirteenth century, when it became the imperial capital at the time when Constantinople was under the rule of the Latins. Its walls are thus about 150 years older than those of Constantinople and, like them, were in active use for more than a thousand years. They, too, are very well preserved and in many ways more picturesque and decorative, though certainly smaller and less monumental, than those of the capital. The fortifications of Nicaea offer many problems which reflect the long period of their use: they were kept in constant repair from the time when the Goths were overrunning the eastern provinces of the Roman empire in the late third century until the age when the Ottomans had established their supremacy in western Turkey. Each period of that millenium left its mark on the walls, usually in a style which can be identified and defined. Similarly, the changing techniques of defense brought appropriate modifications to the circuit. At Constantinople, the emperors left a relatively rich record of their activity; at Nicaea, the written record is sparse, with only four inscriptions surviving *in situ* to identify the works of only three emperors. Other inscriptions still exist or have been reported but their association with one or another part of the walls is problematical. Consequently, the chronology of the walls is even more difficult to establish than at Constantinople, and a somewhat different method will be adopted to deal with it.

The discussion which follows will begin by covering old ground with a survey of the history and defensive techniques of the Nicene fortifications, following work which has long since been

done with considerable competence. It will then present a quite detailed account of the walls and towers, noting in each case peculiarities of masonry or construction which seem worthy of attention. In this, a new element will be added: the various kinds of mortar employed will be noted and described in an attempt to determine the value of such material for the present investigation. Then, when the great variety of masonry and mortar has been presented, an attempt will be made to establish chronology by all means available. This chapter will conclude with a sketch of the history of the walls of Nicaea and will, I hope, have provided material of value for the study of the remaining fortifications. Since none of these is so extensive or complicated as Constantinople or Nicaea, they will be treated on a far smaller scale.

HISTORY

Nicaea was already a great city in the Hellenistic and Roman periods, and the former has left its mark in the regular rectangular pattern of streets so well designed that all four gates of the city may be seen from the intersection of the two main boulevards in the centre, by the Byzantine church of Saint Sophia. The rulers of that age also surrounded the city with its first fortifications, a wall still standing in the time of Strabo; it has left no trace.¹ A great deal, however, is still standing of the Roman wall built as a response to the devastation of the city by the Goths in 256 or 257, in the course of a raid which captured and plundered the flourishing cities of Bithynia.² The new walls were begun by Gallienus and were under construction in the reign of the usurpers Macrianus and Quietus (260–261). These emperors all depicted the walls on their coins, a phenomenon which reflects the importance of the construction and provides, incidentally, the first and only surviving contemporary representation.³ According to inscriptions still visible over the Yenışehir and Lefke gates, the fortifications were completed by Claudius Gothicus in 268 or 269. Little is heard of them in the succeeding centuries of Late Antiquity. They were certainly in use in 365, when the forces of the pretender Procopius took the city and defended it against a siege led by the emperor Valens. The severe earthquake of 368, which devastated Nicaea, most probably inflicted severe damage on the walls, although they are not specifically mentioned; they might also have suffered in the previous quakes of 358 and 362. For the rest of the age, the sources are silent; Nicaea is not even mentioned in connection with the destructive Persian war of the early seventh century, when it is hardly likely to have escaped assault or capture.

During the Dark Ages, Nicaea assumed the role it was long to maintain, that of a major fortress on the main highway from Constantinople to the East; and, probably from the middle of the eighth century, was the capital of the theme, or military province, of the Opsikion, which controlled the defences of the strategic northwestern part of Anatolia. It was naturally the object of attack by the Arabs who in 727 surrounded the city with a large army and levelled a part of the walls in an effort whose failure the monkish chronicler attributed to the miraculous power of the icons. Nature added further troubles in 740 when the great earthquake which struck the walls of Constantinople inflicted such damage on Nicaea that, it is said, only one church was left standing. In the period of recovery, when Byzantium began to move on the offensive against the Arabs, Michael III carried out an extensive rebuilding of the walls in 858, a work attested by numerous inscriptions, none of them found *in situ*; the proximate causes of this rebuilding are unknown.

The fortifications of Nicaea were constantly maintained, even during the period when Byzantine power was at its height and Anatolia generally peaceful. In the early years of Basil II, civil discord was still a great source of danger, and in 978 the rebel Bardas Sclerus captured the city after an attack with siege machinery which inflicted severe damage on the walls. The greatest

danger, however, remained that of earthquakes, for in 1065 Nicaea suffered the worst natural disaster in its history, with most of the city and a good part of the walls being levelled. The fortifications were evidently soon repaired: in 1080, the place was captured by the rebel Nicephorus Melissenus with Turkish help, and resisted the attempt of the emperor Botaniates to recapture it. Not long after, it fell into the hands of the Turks and for a time became the capital of the first state which they founded in Anatolia.

The city walls played a major role in the early stages of the First Crusade in 1097 when they were attacked by the European forces who caused considerable destruction to the southern part of the circuit. The crusaders did not have the glory of taking the city, however, for the Turks surrendered to the emperor Alexius Comnenus, and Nicaea came once again under Byzantine rule. In the declining years of the Comnene dynasty, in 1185, it was attacked and taken by Andronicus Comnenus, and in the catastrophes which soon followed, it assumed a new and more glorious role. After the capture of Constantinople by the Fourth Crusade, the Byzantines took refuge in Nicaea and made it their capital. Theodore Lascaris (1205–1222), the emperor who was crowned there, carried out an extensive rebuilding of the fortifications in 1208, a date revealed by an inscription now lost.⁴ His successor, John Vatatzes (1222–1254) made the greatest change to the appearance and nature of the walls by adding the lower outer wall and by raising the existing walls and towers, acts specially singled out for praise in the otherwise remarkably vapid, though elegant, encomium of the city by his son, the prince Theodore Lascaris.⁵ After this, little is known of the walls of Nicaea, which continued to protect one of the few great cities left to the dwindling empire until it was captured by the Ottoman Turks in 1330. Under their rule, prosperity lasted only for a century, after which the city entered into a long period of decline, not conducive to rebuilding or even maintaining the walls.⁶

TECHNIQUES OF DEFENCE

The walls of Nicaea now visible resemble those of Constantinople, though on a smaller scale: both have an inner and outer wall with a ditch before them, but the entire circuit of Nicaea, almost exactly five kilometres, is shorter than the land walls of Constantinople between the Sea of Marmora and the Palace of the Blachernae. This resemblance, however, is the product of one of the last moments in the existence of the Byzantine walls. In the course of a millennium, they underwent substantial changes, which may best be considered by examining the defences of the three major periods which have been established.⁷

In their original form, the walls were quite different from what is seen today. They consisted of a single rampart with walls of mortared rubble decorated with brick bands, and widely-spaced towers entirely of brick; a ditch probably lay in front, but its existence is not attested before the eleventh century. The walls had a core of rubble, well packed in mortar, with a smooth facing of stones so placed that their flat sides were exposed amid a good deal of mortar. Bands of four bricks decorated and reinforced the wall at wide intervals; they ran entirely through its width which was on the average somewhat less than four metres. In this construction, the wall displayed the principles that were subsequently followed at Constantinople. It stood about nine metres high and had a wall-walk reached by stairs built against its inner face. It thus had only one defensive zone, not being pierced by loopholes at a lower level.

The towers, which stood 60–70 metres apart, were of a similar construction, with a shell of brick covering the mortared rubble core. Some of the bricks penetrated more deeply into the core to provide an anchor for the facing; wooden beams seem not to have been used. The towers, all of which appear to have been semicircular with a diameter of eight to nine metres, were bonded to the wall. Many, if not most, of them had posterns entered from the inner face through

a vaulted passage which made a sharp turn to the right to allow troops to exit next to the face of the wall. They thus followed the Hellenistic principle seen at Constantinople of allowing the troops to be protected by the shields on their left arms as they sallied forth. Because of later rebuildings, the upper part of towers of this period has not been preserved, and details of the topmost chambers or platforms cannot be reconstructed, nor the height of the towers determined. It is evident in many cases, however, that there were vaulted chambers at the level of the wall-walk without openings to the outside; they thus had no defensive function, but were probably used for the storage of weapons and supplies. Virtually nothing is known of the loopholes or embrasures of this period, when the main defensive zone would appear to have consisted of the upper chambers or, more probably, platforms. An incident which took place during the Arab siege of 727 suggests that, at that time at least, the towers were surmounted by platforms, for an Arab who stoned and trampled an icon of the Mother of God had, during the attack on the next day, his own head crushed by a stone from a catapult.⁸ The only suitable place for mounting such a weapon would have been a platform on a tower.

The second period saw major changes as a result of extensive rebuildings in the eighth and ninth centuries.⁹ In the first of these, the walls were raised by the addition of a new wallwalk and parapet made entirely of spoils, most of them apparently the seats of a theatre along with numerous bases of statues or columns. The stones were laid flat to provide the new wallwalk, and at right angles to it as a new parapet upon which additional stones acted as crenellations. This work, which was probably carried out by Leo III after the Arab attack, involved raising the height of the wall by about 1m80 in an apparent attempt to compensate for the increased ground level on the outside. It affected the whole eastern side of the wall, and much of the southern.

The rebuildings of Michael III in the mid-ninth century were on a greater scale and represented significant changes in the defensive system. In them, new towers were added, especially on the eastern and southeastern sides between the Yenisehir and Lefke Gates, so that the former separation was halved. The new towers were of brick in close imitation of the original, but differed in several aspects: the bricks were somewhat thicker and laid in a different way; they were not bonded to the wall and did not have posterns; and they usually had a stone base. These towers were built at a level about two metres higher than the original, indicating a period during which silt and dirt had accumulated to raise the former ground level, and reflect major changes in the methods of defence. In some cases, they have chambers with loopholes at mid-height, just below the wallwalk; more often, the chambers have loopholes or embrasures and are situated at the height of the wallwalk or slightly above it. The defences of this level were thus presumably by archers or ballistas. On the top was a crenellated platform, evidently unroofed, for the installation of catapults; in one case, T97, the actual crenellations have been preserved through later rebuildings.

The eighth and ninth centuries, then, saw a major strengthening of the defences with higher walls and towers, additional towers more closely set, and at least two levels of defence in each tower. This system seems to have sufficed for some 400 years until the final and most far-reaching changes were made by the Lascarids, when Nicaea was capital of the empire in exile. Theodore Lascaris, who founded the dynasty, built some large and powerful towers, higher than any that had previously existed, but made no fundamental alteration to the system of defence. It was left to his successor, John Vatatzes, to make the changes which produced the circuit now visible. By adding a low outer wall with a ditch before it, and by raising the existing towers and walls, he produced a unified system of defence, highly praised in his day. The resemblance of these walls to the fortifications of Constantinople was probably no accident, since Nicaea had for the time replaced the former capital.

The greatest change to the existing fortifications was the addition of the outer wall which, by its consistent use of the same masonry and mortar, was obviously the product of a single building project. It is relatively small: never more than 2m thick and 3–4m high, with an additional 2m of crenellations. It stood 13–16m in front of the main wall, and seems to have been built on the scarp of the old ditch. A new ditch, whose original dimensions cannot now be determined, stood in front of it, and has left its traces in many places where now a small stream, sometimes muddy and almost stagnant, runs around the walls. As at Constantinople, the towers of the outer wall were set before a section of curtain of the inner to strengthen the joint defence. The wall was defended from splayed loopholes of varying design, usually four between each tower, at ground level, and from its crenellated wallwalk, reached by double flights of steps built against the inner face. The towers were semicircular, either open gorge or with closed chambers, and were defended from crenellated platforms about a metre higher than the wallwalk. The outer wall surrounded the city on the land side, but did not duplicate the inner wall where that stood directly on the lake. It therefore would have had about 105 towers.

In the same project, the inner wall was raised to give better fire over the new outer wall and to provide a combined defence. By this time, the ground level had risen another 40–60cm. The raising of the towers more than compensated for the new ground level by adding another 2m50 to their height. Upper chambers were frequently built in the new superstructures and pierced with loopholes or embrasures to suggest that crossbows and large ballistas were both in use; the exceptionally large embrasures in several towers indicate that heavy equipment was installed. In most cases, the upper chamber gave access to a crenellated platform. In this project, or perhaps earlier, the posterns in the towers (which would in any case have been rendered useless by the increasing ground level) were blocked and converted to vaulted passages, probably used for storage. Most of the towers, as a result of these changes, had two defensive areas, the chambers and the platforms, but several had preserved the earlier chambers and could thus be defended at three levels.

The final modifications to the defensive system seem to have taken place in the Palaeologan period, the last in the existence of the Byzantine city. In these, many towers, particularly their upper platforms, were reinforced, and others, including those along the lake, were raised. Loopholes were frequently blocked, and embrasures narrowed to become loopholes. These changes were probably connected with the installation of heavy artillery, probably the trebuchet, with concentration on the upper platforms, perhaps a result of the new menace of the Turkish bow as well as a reflection of reduced manpower. In these, the final stages of Nicaea correspond with those of Constantinople. Unlike the capital, though, there is no clear evidence that Nicaea saw any further change, or even substantial rebuilding under the Turks, for whom the place was one of ever diminishing importance.

THE TOWERS AND WALLS

The fortifications of Nicaea pose special problems in that few sections are dated by texts or inscriptions and the variety of styles of masonry is enormous, corresponding to the long and complex history of the city. It is not therefore possible to begin with the dated material and then to proceed to direct comparisons with the undated. Rather, it will be necessary to describe the circuit in some detail, concentrating on those parts which are of special interest. Since this work has not been done, the section which follows will necessarily be long. It will describe the major types of walls, with their masonry and mortar, using code letters for them which will be found in the accompanying tables of provisional classification of both: see Tables II on page 118 and III on page 119. After the description, an analysis will be attempted, working from the material which can be reasonably well dated toward the rest.

YENISHEHIR GATE

- T1: Large round tower of brick on base of spoils with circular chamber. Base of regular rectangular spoils well laid in courses, with joints filled with mortar and pebbles [F6]. One stone of the second layer from the top bears a cross in relief facing the entrance (fig. 1c).
Superstructure of fairly regular brickwork [A2], mostly whole bricks. Upper circular chamber formerly roofed with huge beams opening onto two arched embrasures, facing east and west, and two splayed loopholes in niches facing south. Mortar: [C3] in base and superstructure, somewhat lighter and smoother in interior.
Neither base nor superstructure is bonded with the third-century triumphal arch behind (fig. 2), nor with its brick superstructure, which has brickwork [A1], and a flooring of whole square bricks with diagonal raking marks, and mortar [A].
Discussion: S 19–21 (gate), 29 (tower)
Illustration: S pl. 7 (plan), 8 (cross-section), 9–10 (views).
- T2–19: General: Even-numbered towers of this section are all brick and bonded to the wall; odd-numbered towers, which have bases of spoils, are not.
Discussion: S 9–16
Plans: S pls. 1–3.
- T3: Base of spoils [F6]; brick facing missing. Square embrasure with spoil for lintel. Mortar [C1].
- T4: Bonded; mortar [A] but with exceptional amount of inclusions, becoming sandy and lighter.
- T5: Base of spoils [F6] in rough rows with much filling of broken stone; brickwork [A2]. Some parts of crenellations preserved where tower later raised with filling of mortared rubble (facing missing). Elliptical upper chamber with three rectangular embrasures, apparently unroofed. Mortar [C2].
Discussion: S 15f, 29.
Illustration: S pl. 22 (view), 23 (plan).
- Gate between T6 and 7: See S 21 and pl. 1; now heavily restored.
- T7: Base of rough spoils [F7], mortar grey to white [C4]. Brickwork [A3] with some very thick brick (fig 6), with mortar [F] on surface, sometimes covered with pink surface mortar.
- T8: (Fig. 3) Bonded; brickwork [A1]; mortar [A].
Round domed inner chamber (no openings) with alternating brickwork; apparently a late reinforcement.
Illustration: S pl. 24.
- T9: (Fig. 4) Base of rough spoils with column drums [F7]; brickwork [A3]; mortar [E] but with more inclusions than usual.
- T10: Only core of mortared rubble survives; Mortar [A].
Plans: S pl. 2, 3.
- W10/11: (Fig. 5) Original wall [C1] raised with battlement of spoils has new facing of alternating brick, with reused brick and very small rubble irregularly arranged with some partial extra brick courses. It has a band of six bricks near the bottom and some intermittent cloisonné in the upper parts. Apparently a crude version of [B4]

- approximating to [D4]. Many square beam holes. Mortar [F] but rather sandy and rougher on the surface, with an exceptional amount of pebbles.
- T11: Mostly destroyed. Mortar [C4].
- T12: Bonded. Apparently knocked down recently. Mortar [A].
- T13: Base of rough spoils [F7]. Many beam holes show that facing, now missing, was attached to core by wooden beams. Mortar: dirty sandy [C4].
- T14: Bonded, facing missing. Mortar [A], whitish and smooth in interior as if quite liquid when poured.
- T15: Base of rough spoils [F7], with mortar [D]. Facing of brickwork [A5] with two rows of enormously thick bricks near the base (fig. 7) in mortar [E]. The core has a vast amount of broken brick of all sizes and shapes roughly thrown in, with coarser mortar than the surface.
- T16: (Fig. 8) Bonded; brickwork [A1] with vertical pointing; mortar [A]. Surface has been repaired in brickwork [A3] with some pointing parallel to the bricks and continuing where a brick is missing or completely covered over with plaster; mortar [D], with pink surface mortar of same colour as the bricks.
- T17: Base of spoils [F7]; mortar [C2]; brickwork [A2] of mostly new, badly made brick (fig. 9). Upper vaulted chamber with three rectangular splayed loopholes; tower later raised.
Illustration: S pl. 26 (plan and drawing).
- T18: Bonded brick tower with three periods: lower $\frac{2}{3}$ of brick [A1] with mortar [A]; above, on west side, repair in brickwork [A3] with mortar [D] and a double brick frieze. Crude superstructure of alternating brick [D4] in mortar [E], which seems to have blocked the crenellations of the second period. Inner circular chamber with similar masonry. In the upper part of the brickwork above the frieze, an exceptionally large square beam hole with spoil lintel, apparently for a huge beam to support a new chamber or platform.
- W18/19: Original wall of mortared rubble and brick bands [C1] with a mortar which appears to be a variety of [A] using mud instead of sand; this was bonded to T18. A new face added in front of it (when the original was delapidated) had a base of large neat spoils [F6] with mortar [H]; superstructure now missing but may have been in recessed brick according to the mortar and analogy with W19/20, *q.v.*
- T19: (Fig. 10) Striking square tower, half spoils, half brick. Lower spoils mostly rectangular, mixed, arranged in rough courses with large gaps filled with stones [F7], all a facing over a core of mortared rubble. Mortar: fine, hard [G] with few inclusions; most joints of spoils covered with pink surface mortar. Upper brickwork [A3], mostly reused broken brick with chamfered mortar and, about a metre above the spoils, a double brick frieze. The bricks below the frieze appear to be so laid that alternate rows are somewhat recessed (but not covered with mortar). On the west side, a brick cross, and on the north a quatrefoil. Numerous small square beam holes with brick lintels arranged in regular rows. Inner square chamber entered from wallwalk with four splayed loopholes set in niches, two facing south, one each west and east. Mortar [G] throughout.
Illustration: S pl. 27 (view), 28 (plan).
Date: 1208, according to an inscription recorded by Covel (157, of which S 53 no. 39 is an incomplete transcription) whose description leaves no doubt that it stood on this tower, and probably in the marble plaque with two arches preserved on the west side: see Raby (1976) 180f, and note that when Covel

refers to "new" stone or "new work", he means spoils rather than original, antique material.

- W19/20: (Fig. 11) Original wall apparently destroyed or at least badly delapidated, replaced by new facing with base of large rectangular spoils in courses with large gaps [F7] and using a friable mortar [E]. These spoils are not bonded with the base of T19, nor with the outer face of T20. The superstructure was in recessed brick with a similar but lighter mortar and cribwork behind; little survives. This seems eventually to have fallen away and been replaced with a poor facing of mixed brick and rubble [G].
- T20: (Fig. 11) Massive round corner tower completely enclosed in a later thick outer shell. The inner shell, of which the upper part is visible and accessible from the inside of the wall, appears to have been built in brickwork [A2] with extensive repairs in [A3]. The two stages are especially evident by the entrance to the upper chambers (fig. 12), where a series of square beam holes show how the new facing was anchored to the old. The inner chamber was a complicated structure in two levels, with one splayed loophole in a niche facing south on the lower level, and three similar loopholes covering the remaining directions from the upper chamber. Both are reached by a staircase which leads from the wallwalk. Fragmentary traces show that the walls of the staircase were decorated with frescoes on a mortar of mud and straw. Mortar of the inner structure; [C, C2, C3], with a highly varied aggregate, some white lime, some very sandy. The bricks have a semicircular raking whose design, where the surface is visible, varies considerably. The outer shell, 1m95 thick, was apparently added because of cracks still visible in the inner shell. It is of brick with a projecting base of few courses of well-fitted spoils [F6]. The superstructure is of reused brick set in chamfered mortar which gives a curious 'soft' appearance [A4]; mortar [F] covered with pink surface mortar; numerous small round beam holes in a row forming no regular pattern. The outer shell blocked the three loopholes of the upper chamber, but a new loophole was put through it to connect with that of the lower chamber (fig. 13). Neither the inner nor outer shell is bonded with the wall. The outer shell is built over the balustrade of spoils with which the adjacent wall has been raised.
Illustration: S pl. 29 (view and plan).
- W20/71: General: Most of the wall from the southeast corner to the towers past the Istanbul Gate, that is, the whole eastern face of the wall, has preserved the raising in neat battlements of spoils [F8].
- W20/21: Banded masonry [C2], which resembles [C1] but uses far fewer bricks, a higher proportion of mortar and has some patching entirely in brick.
- T21: Ruined, facing missing; mortar [C4], mostly of pebbles.
- W21/24: (Fig. 14) Banded masonry [C2], runs behind towers 22, 23 and 24. Bricks of bands with fairly wide separations, not well arranged, frequently missing or covered with mortar. Battlements of spoils.
- T22: (Fig. 15) Badly destroyed, apparently two periods visible. Outer face on south side (rest missing) has recessed brick [B1] with mortar [D]; enormous number of beam holes visible in the core suggests that this facing is secondary. This masonry continues into the windows of an embrasure where alternate bricks are recessed, but not covered with mortar. The inside face of the same wall uses an alternating brick [D3] in which the layers of rubble are relatively narrow; if they were covered with plaster (of which some traces remain), they would present the appearance of recessed brick with wide mortar joints similar to the outer face. The chamber be-

- hind this superstructure was later reinforced by a wall of crude alternating brick [D4] with large square beam holes and mortar [F].
- T23: (Fig. 16) Large decagonal tower of brick with base of spoils built against and over the wall. Facing of brickwork [A4], mostly reused broken brick; chamfered mortar [F] covered with pink surface mortar. Few beam holes visible, but evident where facing missing that there is an extensive system of cribwork just behind the surface. Circular defensive chamber slightly above wallwalk, approached by steps in entrance passage. Two narrow splayed embrasures with square antechambers on either side of which are rounded niches (fig. 17); same brickwork as exterior; mortar [F]. A staircase leads from here to the upper platform on top of the tower. Illustration: S pl. 23 (view), 28 (plan).
- T24: Facing badly damaged to reveal extensive system of cribwork; surviving face of brickwork [A4].
- T25: Brick tower on base of spoils, with three periods. Base of rounded spoils [F6]; lower half of superstructure in brickwork [A1]. Upper brickwork [A3] with cribwork of large square beams. Loophole with spoil lintel and brick arch above blocked with crude filling of brick and rubble. Upper chamber reinforced (fig. 18) with wall of exceptionally crude alternating brick [D4] in which fragmentary bricks form partial courses amid very rough rubble; cribwork.
- W25/26: (Fig. 19) Banded masonry [C2] with very rough brick bands in which horizontal pointing fills the place where a brick was not inserted or has been covered with mortar; mortar [E]. Where surface missing, mortar [A].
- T26: Brick tower with well preserved upper chambers built against and over wall. Lower facing missing to reveal core with mortar [A]. Upper facing of brick [A3] with mortar [E]; mixed whole and fragmentary brick; whole bricks, apparently new when laid, lack raking marks. Two chambers: lower entered from wallwalk, and at slightly lower level, circular, domed; no openings. Upper, entered by stairs from wallwalk, originally had three very wide embrasures later narrowed to become loopholes; staircase from it to platform. This chamber was decorated with frescoes showing figures of saints, now badly defaced by graffiti.
Illustration: S pl. 31 (plan), 32 (view).
- T27: Base of rough spoils [F7] in mortar [C4], predominantly pebbles. Little facing visible in brickwork [A6] with wide mortar joints which resembles recessed brick but has no bricks behind mortar. Upper chamber reinforced in exceptionally crude alternating brick [D4], with fragmentary brick courses hardly parallel; mortar [E].
- W27/28: Surviving traces of facing suggest banded masonry [C2] with recessed brick in bands and many stones completely covered with mortar.
- T28: Not bonded. Facing missing; behind, many large square beam holes; mortar [C2], sandy to white. Superstructure with large rounded embrasures in alternating brick [D2] with mortar like [E] but with more brick. Reinforcing wall built against superstructure (or as a buttress) in similar masonry with mortar [F].
- T29: Mostly destroyed; surviving facing with brickwork [A6], with exceptionally wide mortar joints resembling recessed brick (fig. 20); large square beam holes of cribwork; mortar [G].
- T30, 31: Only survive as mounds.
- W31/32: Apparently [C1], but has square beam holes with lintels of stone or brick.
- T32/37: General: In this section, the odd-numbered towers are bonded to the wall and have lower chambers like vaulted passages entered from the interior of the city at

- ground level. The even-numbered towers are not bonded and have a base of spoils. Brickwork [A2]; mortar [C3].
- T32: Facing of recessed brick [B1] with many square beam holes with brick lintels; mortar [H] with brick. Round chamber without openings just below level of wallwalk. Vaulted passage at ground level.
- T33: Mostly destroyed; survives as base of spoils [F7] with pile of mortared rubble above; mortar [C4] with very small inclusions.
- T34: Little surviving facing shows recessed brick [B1] with mortar [H], cribwork behind; attached to core with mortar [A]. Vaulted passage at ground level.
- T35: Base of very rough spoils [F7]; mortar [C2].
- T36: Extensively repaired in 'covered' brick [B2] with layer of fieldstones completely covered over with smooth coating of plaster. Some cloisonné, not very consistent, in upper part. Massive spoils form base of wall adjacent to postern of T37; mortar [E].
- W36/37: (Figs. 21, 22) Tower of brickwork [A1] extensively repaired in an unusual recessed brick [B1] where the lower courses are not recessed and contain a row of very narrow cloisonné; somewhat above that, a partial row of bricks projects from a band of mortar; then recessed brick is consistent, though the lower rows are irregular. Regularly arranged square beam holes attached this new facing to the core. Vaulted passage at ground level.
- T37: Illustration: S pl, 33 (plans), 34 (view).
- W37/38: Upper part rebuilt in 'covered' brick [B2] with much plaster over fieldstones, and band of three bricks, apparently recessed; decorated with brick cross and concave round objects with holes.
- T38: Tower of brickwork [A1], mortar [A], extensively rebuilt in recessed brick [B1] with mortar [E2]. Recessed brick irregular: in lower part, many courses not recessed, and one section where brick appears to be completely lacking — that is, entirely plastered over. At the top, a now fragmentary decoration of a row of brick lozenges; on the southeast side at a high level, a brick cross. Vaulted passage at ground level.
- T39: Base of poor spoils, mostly column drums roughly arranged with large gaps [F7]. Lower round vaulted chamber.
- T40: Shell restored in covered brick: vaulted passage at ground level.
- T41: Brickwork [A2], mortar [D]. base of spoils. Not bonded.
- W41/42: 'Covered' brick [B2]; mortar [E]; beam holes in upper part outlined in brick.

LEFKE GATE

- T43: (Fig. 23) Curious structure built into angle between city wall and wall of inner court of gate, inaccessible in time of Schneider. Thick walls, two rounded projections, and loopholes facing city. Elaborate brickwork [C11] with numerous square beam holes in rows.
- T44: Base of rough spoils in courses [F7]; brickwork [A2] mostly of reused broken brick, a few with diagonal raking; mortar [C1].
- W44/45: Byzantine aqueduct pierces the wall here, and is evidently later than it: the lower part of its pier is perfectly straight, but the upper sections are irregular in outline, showing that they were built to fit an existing opening. Brickwork of pier resembles [A3], mostly new bricks on south face, but interior largely of broken brick; mortar [C3]. Schneider saw a bit of very incrustated water channel of hydraulic mortar on the pillar; the direction of the aqueduct could be determined by another pillar which stood in the adjacent Turkish graveyard; it ran east.

- In this area, Schneider could see a depression about 18 metres wide, apparently the remains of the original ditch, on whose escarpment the outer wall was built; similar traces were noted south of the Lefke gate.
- W45/46: Masonry [C1] with base of spoils.
- T46: (Fig. 24) Base of large well cut spoils arranged in headers and stretchers with hardly any mortar [F5]; superstructure of brickwork [A1] with mortar which resembles [E2] or perhaps [A] with a greyer aggregate than usual. Extensive repair in a crude 'covered' brick [B2] with single and double courses of brick, many covered with mortar; mortar [F]; numerous small round beam holes in rows, but in no pattern.
- T47: Base of rounded, fitted limestone blocks [F5]. Above, on west face, recessed brick [B1] with mortar [H] covered with brick red surface mortar; adjacent, on south-west face, very regular cloisonné [E1] with mortar [F]; bricks of cloisonné quite superficial, not reaching more than c20 cm into wall. Chamber without openings below level of wallwalk.
- T48: Base of neat limestone blocks [F5] with brickwork [A1] in mortar [A] above. Large repair on west side in brickwork [A3] with pointing parallel to bricks and, in some parts, very wide mortar joints (not recessed brick as S32); mortar [G] with some brick; one large square beam hole; at top, double brick frieze. Above this, superstructure (or raising) in rough alternating brick [D4] with some irregular cloisonné; mortar [E] or [F]. Vaulted rectangular chamber at level of wallwalk, with stairs to upper platform.
- T50: Base of well fitted rounded spoils [F5] with superstructure in brick [A1]; mortar [A] mostly covered with pink surface mortar. Whole west side is a repair with single, double and triple courses of cloisonné alternating with bands of three to five bricks [C10]: the large fieldstones of the cloisonné are mostly covered with pink surface mortar; vertical bricks of the cloisonné do not make contact with the horizontal; most bricks fragmentary; surface quite superficial with few beam holes, but where missing great numbers of round beam holes and cribwork evident; mortar apparently [E2].
- T54: Base of spoils [F6]; superstructure brickwork [A2]; mortar sandy [C1]. Outer face repaired in recessed brick [B1] with mortar [G]. Upper chamber with embrasures.
- W54/55: Base of very neat spoils [F5]; masonry [C2] above includes rougher stonework than usual with many spoils and rather irregular brick bands; mortar [B]; above, a repair in similar style with mortar [F].
- W55/58: Building joint behind each tower to show that this part of wall was constructed in very short sections.
- Many broken towers in this and the following section, which is generally poorly preserved, are mere stumps with mortar [A].
- T58: (Fig. 25) On original core with mortar [A], small section of recessed brick [B1] with rather thick bricks and mortar [H] with more brick than usual partly covered with light pink surface mortar. Above that, and covering most of the tower, an elaborate cloisonné with banded brick [C10]: in the bottom half, bands of three bricks alternate with single layers of cloisonné; the upper part is mostly cloisonné with single brick courses separated from the lower by a band of seven bricks. Few beam holes appear in the relatively superficial surface, with more visible where the core is exposed. Mortar of cloisonné [G]; bricks somewhat thinner than those of recessed brick; surface mortar, which covers most fieldstones, somewhat darker.
- T64: Crude base of roughly arranged spoils [F7], quite high; superstructure missing.

- W64/65: Tower was built against wall which had been raised with battlements of spoils. Base of well-fitted spoils [F5]; above, some stonework in mortar [A]. Much of face evidently rebuilding: bricks in bands of all different sizes, plainly reused, some parts entirely brick resembling [A2] with very narrow joints; much mortar [D]. Most joints and many stones covered with pink surface mortar.
- T65: Bonded with wall; base of rough spoils [F7], upper facing gone; mortar [A].
- T66: Not bonded, built against and over wall. High base (about 2m above present ground level) of spoils with wide joints [F6] on projecting lower foundation; mortar [C3] with much pink surface mortar. Upper brickwork resembles [A2] with a mixture of thin and thick bricks; whole bricks on the surface, many fragmentary within; mortar [C3]. Upper trapezoidal chamber with three embrasures; in one opening, much broken brick with diagonal raking used; vaulting supported by consoles of column drums.
- W66/67: Masonry [C1] with reused bricks in bands; mortar [A].

ISTANBUL GATE

- T67: Base of extremely neat limestone blocks, evidently cut for the purpose [F5]; rough brick superstructure with bricks of all sizes and thicknesses, perhaps [A2]; mortar apparently [C3]; not bonded to W66/67.
- T68: Base of fine spoils (fig. 26) as 67 [F5]; brickwork [A1]; mortar [A]. On outer face, large repair in brickwork [A3], mortar [D], with many small round beam holes.
- W69/70: Looks like [C1] raised with battlement of spoils, but mortar [E], much covered over with pink.
- T70-72: (Figs. 27, 28) Originally round towers of which the core with mortar [A] survives. Subsequently covered with a mantle entirely of spoils, finely cut and arranged in regular courses; mostly rectangular, but with an occasional row of column drums [F1]. Very narrow joints filled with brick fragments and red surface mortar. On the inner face of the towers and intervening walls (which are covered in the same way), the spoils are less carefully arranged, with wider interstices. Walls and towers have a parapet of similar spoils; tower 70 has a cornice of marble. Mortar [B] throughout.
- Date: On the upper part of the inner face of T71 (fig. 29), inscription of Leo III and Constantine V, with the *curopalates* Artavasdus, datable to 720/741, and most probably to the period after the Arab attack of 727.
- Name: According to the inscription, this was the *πύργος Κεντινάριος*, a name evidently derived from the Latin *centenarius*, and presumably having reference to a body of 100 men, or a centurion, associated with the structure. A tower with the same name stood in Constantinople, on the shore below the Great Palace: see Janin (1964) 293; it was described as a "great tower".
- Illustration: S pls. 35, 36 (views).
- W73/74: Inside face with much modern restoration in lower parts: masonry [C1] with small spoils and broken fieldstones forming a relatively flat surface made smooth by the addition of rough red mortar; bricks of bands mostly new, diagonal raking visible where broken; mortar [A] and [E].
- T74: Semicircular, with postern which bends to the right (seen from the inside) as usual; brick [A1] with diagonal raking; mortar grey version of [A]. Bonded in distinctive way: bricks of tower turn corner into wall and continue about 50 cm. Illustrations: S pl. 37 (elevations), 38 (view).
- T76: Square, brick, by lake: brickwork [A1], mortar [A]; upper part (fig. 30) of rough

- banded masonry [C6] with bands of 4 bricks alternating with 2 or 3 levels of fieldstones, mortar [E2] with much brick. Upper part appears to have been added when tower was in poor condition.
- W78/79: (Fig. 31) Banded masonry [C7]: bands of six bricks separate three or more rows of fieldstones with extra courses of single or double bricks between them; mortar [A] with much brick.
- T79: Round brick tower with arched entrances at ground level, built at a point where the wall makes a right angle; mortar [A].
- Discussion: Covell 154, according to whom the tower was known as the prison of Saint Nicholas.
- W79/83: General: Most of the walls and towers of this section are missing, and were already ruined in the time of Covell. Surviving traces of wall, especially 79/80 resemble W78/79, but with a grey surface mortar covering the stonework.
- T83: Square tower originally of brick, facing now missing, mortar [C1], with the surviving base of roughly coursed spoils [F7] in mortar [C2], joints mostly covered with red surface mortar. Subsequently, the superstructure was rebuilt in alternating brick [D1] with thick bricks (fig. 32), courses of varying width, spoils and fieldstones with their flat sides exposed to form the smoothest possible surface, and a single brick frieze near the top; mortar [E]. Double upper chamber. Illustration: S pl. 38; Foss (1982) 198 fig. 32.
- Discussion: Foss (1982) 197-199.
- T84: (Fig. 33) Round tower on the left of the now-vanished Lake Gate. Originally of brickwork [A1] with mortar [A]. Most of the west face was repaired, evidently after an earthquake in an elaborate banded masonry [C9] in which the bands alternate rhythmically with single courses of fieldstones set in much mortar, thus (each number refers to the bricks in a course; each point represents a row of rubble): 2.3.2.2.3.2.2.4.2.2.3.2.2.3.2.2.3. Bricks are rather thin; facing has many large square beamholes and much grey surface mortar which obscures the mortar of the interior. This masonry continues into merlons decorated with single or double courses of brick. Brick courses of upper part run through the wall. Crenellations still visible because subsequently blocked by a raising in rather irregular alternating brick [D4] with mortar [E].
- Illustration: S pl. 39.
- W87/88: Banded masonry [C7] with bands of 3-4 bricks and extra courses of single and double brick separating the very rough rubble which is mostly covered with a pink surface mortar.
- T88: (Fig. 34) Irregular polygonal tower built against the wall. Base of rough spoils hardly arranged in courses with large gaps filled with broken brick and usually covered with pink surface mortar. At the centre of the base at eye level, a reused impost capital with a cross. Superstructure of complex banded masonry [C8] in a pattern less rhythmical than that of T84: in the lower half, triple courses of brick alternate with irregular double courses of rubble with an occasional extra partial course of brick amid the stones; above, four double courses of brick with single courses of smaller stones; a course of 4 bricks runs along the top of the loopholes, then 2.3.4. and, quite irregular, 1.3.3.1. It appears that a complex pattern is intended. Mortar [E] without brick; no vertical brick or cloisonné; many small round beam holes, usually in the rubble. Upper circular chamber with passages leading to three splayed loopholes and stairs to upper platform.
- Illustration: S pl. 39 (view), 40 (plans).

- W88/89: (Fig. 35) Southern part bonded with tower 89 whose brickwork turns corner and continues about 30 cm into wall; for next 3m, base of large spoils, superstructure masonry [C1], mortar [A] in lower parts, [E2] upper. Most of the wall a rebuilding in an elaborate style of 'covered' brick and cloisonné [B4]: at the bottom, apparently two sets of three rows of cloisonné each, separated by a triple brick band; above, layer of fieldstones heavily covered with mortar separated at irregular intervals by alternating single and triple courses of brick; superstructure of rough mortared rubble with a single course of brick, probably representing the same masonry with the surface mortar weathered away. Mortar [E]; surface mortar of cloisonné grey, of upper part pink. Whole surface forms a rather shallow covering over a core of mortared rubble; cribwork behind, and small round beam holes in the brick courses of the surface.
- T89: Circular corner tower with large round openings for embrasures of upper chamber. All brick: brickwork [A3] with wider separations than usual, mortar [E]; numerous small square beam holes, most of them, especially in the lower half, covered with grey mortar which stands out amid the pink mortar of the surface. This shell seems to have replaced an earlier one with mortar [A] and many whole bricks in the interior. On the west side, a repair in alternating brick [D2] with mortar [E] almost without inclusions. Above it, a large opening, apparently the place where an arch joined this tower to the wall from the lake shore. Mortar of arch: [E]. Although the north part of the tower is at least partially bonded with W88/89, most of it is built against and over the wall like T23, 26; not bonded with W89/90.
- W89/Lake: (Fig. 36) Lower sections in neat facing of spoils [F1] with narrow gaps filled with small broken spoils and brick; mortar [B] covered with a hard grey surface mortar. Upper part of smaller spoils in courses, [F2], mortar [E].
- W89/90: (Fig. 37) Originally of masonry [C1] with mortar [A]; brick bands visible where later surface broken away. Completely covered in alternating brick [D1] with single or double courses of rather thick brick; mortar [E].
- T90: Mostly destroyed, but evidently was brick tower bonded to wall, made of well-arranged new bricks [A1] in mortar [A].
- W90/91: Originally, [C1] with mortar [A] much covered with pink surface mortar; many repairs with broken spoils in mortar [E].
- T91: Upper part bonded to wall; on ground level, postern opening to west with large spoil blocks as doorposts and lintel; part of this is blocked by the adjoining wall, of which the lower section is thus a repair. Mortar [A]. Behind it, steps leading to an upper chamber, now mostly destroyed, valuable in calculating the height of the original wall: S 11.
Illustration: S fig. 3 and pl. 41 (plans).
- T92: Bonded; brick [A1] in mortar [A]. Circular chamber at intermediate level with single splayed loophole; apparently 3 embrasures or loopholes at upper level.
Illustration: S fig. 15 (plan), pl. 20 (views).

SOUTH LAKE GATE

- Gate: Sides built of spoils so well fitted that virtually no mortar is used [F5]; brickwork above with mortar [A] on left, [C1] on right; latter partly covered with mortar of mud and straw on which traces of a fresco barely survive: a square with green and black in the lower part, surrounded by a red line.
- T93: Complicated semicircular brick tower with repairs and large superstructure added later; several chambers behind at different levels. Original face (fig. 38), without

- beam holes, of brick [A1] in mortar [A]. On the south side, a large repair in brick [A3] with thin and thick brick and wider mortar joints than usual; mortar [E]; square beam holes with brick lintels; surface mortar pink with large lumps of brick, lighter than the reddish mortar which covers the original brickwork. Upper facing missing. Superstructure (fig. 39), best visible from the back, in alternating brick [D2] with single layers of rubble separated by single double and triple courses of brick; many vertical bricks, but not a regular cloisonné; mortar [E]; numerous square beam holes, not regularly arranged. Behind the tower, chambers at various levels: at ground level, a vaulted passage with brick arch and mortar [A]; above it, a second opening of similar style, apparently ruined when superstructure added. Superstructure has lower chamber entered through arched opening below level of wallwalk; well preserved, vaulted in brick set fairly far apart, mortar rather powdery [G]. Main upper rectangular chamber entered through tall arched opening, apparently from wallwalk; outer wall with embrasures or loopholes missing.
Illustration: S fig. 25 (simplified plan); pl. 20 (front and back views).
- T94: (Fig. 39) Small corner tower built entirely of well cut spoils arranged in ashlar [F1]; ends in marble cornice; traces of battlements of spoils; mortar [B], largely covered with dark red surface mortar. Seen from the back, the inside is a mass of mortared rubble and huge spoils thrown together in mortar [E2].
Illustration: S pl. 20, 42.
- W94/95: Outer face: Lower part of ashlar spoils [F1] bonded with tower 94; mortar [B] sometimes almost without brick. Above, 'covered' brick [B2] with single courses of rubble separated by single, occasionally double, courses of rather thick brick; mortar [E2]; rubble heavily plastered with coating of pinkish grey surface mortar, so that, when new, it would have given the appearance of regular courses of brick with bands of smooth mortar and occasional stones showing through. Many small round beams still visible.
Inner face: (fig. 40): lower courses of rough spoils with column drums barely arranged in courses [F7]; above, a narrow row of cloisonné, then an alternation of large rectangular spoils in regular single courses separated by brick bands of varying width [C5]; mortar [G]; some parts of core with mortar [A].
Illustration: S pl. 42.
- T95: Square brick tower with base of rough spoils [F7] not bonded to the quite different spoils of W94/95; superstructure of brickwork [A2]; mortar [C2] throughout. Upper west corner by wall: repair in alternating brick [D2] with single courses of brick and large square beam holes, mortar apparently [E]. Upper rectangular chamber with four embrasures, two facing outward, one to each side.
Illustrations: S 34 fig. 16 (plan).
- W95/96: (Figs. 41, 42) Basically, a continuation of W94/95 in same style: lower parts in ashlar spoils [F1]; upper 'covered' brick [B2] but here with mortar [G] and whiter mortar on surface. Where mortar missing, masonry resembles [D4]. In upper parts, some column drums. Near T96, a small reinforcing buttress and above it, and through that section, a double brick frieze less than a meter below the top of the wall. Many small round beams in this section. In the lower part of this wall near T96, a reused late antique inscription (probably V/VI century): S 51 no. 35.
Illustration: S pl. 44.
- T96: (Fig. 42) Square tower; lower half spoils, upper half brick. Spoils, which seem too high to be called a base, of regular blocks laid in neat courses with large inter-

stices filled with pebbles and much rough dark pink surface mortar [F6]; quite different from W95/96 whose spoil blocks are much closer fitted, though the size and shape of the blocks here suggest that they came from ruined parts of that wall. Mortar of spoils [E2] and apparently [A]. Superstructure of brickwork [A3] in a mortar which resembles [A] with rather less brick. Square chamber at level of wallwalk with six large rectangular or shield-shaped embrasures, two on each side; inner walls of chamber have chamfered mortar. Tower bonded with W96/97, but not with W95/96 (see below).

Illustration: S pl. 43 (plan), 44 (view).

W96/97:

In part, lower courses of spoils as in T96 except that bricks are sometimes inserted vertically between several to form a kind of cloisonné. Most of the face is in an elaborate 'covered' brick with single, double or triple courses of brick [B3] set amid single courses of rubble which has been largely covered with a pink surface mortar. In some cases, extra fragmentary courses of brick have been covered with mortar; this, however, is not recessed brick, since it does not contain the regular courses of brick set back in a bed of mortar. In the upper part, visible now only next to T96, a row of decoration with brick lozenges and above that a double frieze (fig. 43). When new, the effect of this wall would have been exceptionally colourful and decorative. Great number of small beam holes mostly square and often still containing beams; many of them set directly below a triple brick band. Bonded with T96 in a complicated way: most of the brick face runs behind the spoils of T96, but in some places, the spoils penetrate into the brickwork; in the upper part, the brick of T96 continues directly into the brick of the wall above the frieze; mortar there resembles [A] with less brick, mortar of rest [G] without inclusions though containing more brick toward the bottom.

T97:

(Fig. 44) Large round tower with crenellations perfectly preserved, complex periods of construction. Base of spoils and banded masonry [C3]: roughly arranged mixed spoils at bottom, mostly large, all joints covered with pink mortar; above, band of seven bricks, then 3-4 courses of small spoils, band of five bricks, 2 courses of small spoils, and superstructure of brick. Bricks of lower half in style [A2]; upper [A3] with occasional large square beamholes. Mortar of lower part dark, sandy version of [C1] resembling [A], seems to continue in upper part. Chamber below level of wallwalk with three loopholes at mid-height. Some square beam holes in upper part of superstructure. On west side, merlon closest to wall has been rebuilt in a simple alternation of rubble and brick, with much pink mortar on surface. Subsequently, whole tower was raised in alternating brick [D2] with mortar [F]; large square beam holes at bottom of filling of each original crenellation. Whole interior built up and strengthened, apparently in same period. Tower not bonded with W96/97.

W97/98:

Outer face mostly overgrown, but where visible is in 'covered' brick [B2] with much pink mortar on the surface to cover the rubble; behind, mortar [G]. A hole broken in the wall next to T97 reveals that this is a face built against an earlier face which resembles a poor version of masonry [C1] in mortar [C1]; this wall was only about 1m50 thick. On the inner face (fig. 45), through this whole section, a series of curious brick arches, with neighbouring arches sharing a common brick pier to the level of the springing; originally about 1m50 thick, presumably supported the wallwalk; mortar [C1]. Arches filled with banded masonry [C4] with bands of five brick separated by about seven courses of well arranged roughly squared spoils; mortar of this filling [C1] but differs from that of the arches in hav-

ing a white rather than grey aggregate, and a far greater density of brick inclusions. Adjacent face later repaired in an irregular alternating brick [D2] with single, double or triple courses of thick or thin bricks alternating with single courses of grey fieldstones; this replaces both arches and filling; mortar like [C1] with grey-pink aggregate.

T98:

Now inaccessible; according to Schneider, same as 97, as appears from his photo, pl. 44, which shows that the lower half had a more regular arrangement of large spoils between the brick bands than did 97; three loopholes in lower part of superstructure, later blocked; same kind of raising which preserved the crenellations. Outer face, where visible, shows base of large spoils in mortar [C3], most of facing with 'covered' brick [B3] with bands of three bricks, resembling W96/97. Inner face: arches as described, one of them filled with massive spoils punctuated by extremely neat bands of six very thick bricks, mortar [C1] and [C2]. In general, the mortar of the brick arches is similar but darker; filling sometimes has mortar [C3]. Some distance after T98, arches succeeded by 'covered' brick, with triple brick bands and many square beam holes with brick or stone lintels, usually in the bands; surface made smooth with mortar [C3].

Illustration: S pl. 43 (arches; drawing).

T99:

Not accessible; according to Schneider, of same style as T97, 98.

W99/100:

Outer face: large ashlar spoils [F1] standing in some places to a considerable height; above, 'covered' brick [B2] with single and occasionally double courses of brick exposed. Inner face, arches: mortar of pillars [A]; of filling apparently dark [C1].

Illustration: S pl. 44.

T100:

Base of several courses of mixed rough spoils, barely coursed; superstructure: banded masonry [C3] with bands of four or five bricks in the style of brickwork [A2] alternating with two, three or four courses of small squared spoils; three blocked loopholes at mid-height; whole tower resembles lower half of T97 or 98.

Illustration: S pl. 44.

W100/101:

Resembles masonry [C1], but with grey mortar on outside, [C3] on inner face, both covered with pink surface mortar.

T101:

Bonded. Postern from whose right side stairway leads through wall to wallwalk.

Illustration: S pl. 46.

W101/102:

Masonry [C1] with base of spoils.

T102:

Base of irregular spoils [F7] with joints heavily covered with pink surface mortar; superstructure in brick [A2] with upper part apparently in [A3] blocking balustrade of spoils. Round chamber with three loopholes with stone lintels; above loophole of outer face, a cross in brick.

Illustration: S pl. 47.

W105/106:

Masonry [C1] with well-preserved balustrade of spoils.

T106:

Large corner tower built inside the wall at a 45° angle to it, with a pentagonal bastion, T106B, on the outside corner. Lower half as far as wallwalk of square and rectangular spoils arranged in courses with gaps and mortar joints of varying size; mortar [E] with tiny black pebbles and not much brick, smoother and somewhat sandy in the core of mortared rubble behind the spoils. This is punctuated by a band of five bricks, whole and fragmentary; above it, a marble plaque with two arches containing an inscription: see below (fig. 46); all joints covered with dark pink surface mortar. Above this, a band of four bricks followed by six courses of cloisonné (fig. 47) with double horizontal courses of brick, and vertical bricks

which do not touch the horizontal; bricks largely broken; within each square, fieldstones largely covered with a pink mortar; large square beam holes in the brick courses. Superstructure of tower all brick, with a change at the level of the springing of the arches of the embrasures: below them, brickwork [A3], many reused bricks, with somewhat wider separations than usual set in a mortar whose aggregate varies from grey to white, with inclusions of brick and black pebbles, usually more of the latter [E, E2, G]. This mortar is all chamfered (figs. 48, 1a) and in turn covered with pink surface mortar. Bricks of upper part more closely set, in chamfered mortar [E2] without covering of surface mortar; on the inside, toward the city at the level of the top of the arches, a single band of cloisonné with larger squares and vertical bricks which touch the horizontal. Large square beam holes regularly arranged throughout superstructure. Upper square chamber well preserved with tall arched embrasures (that facing the city perhaps a window, or indication that this is a keep which could be defended in all directions, independent of the walls); interior dome supported on fine squinches of brick.

Illustration: S pl. 47 (plan), 49 (view).

Date: Dated by inscription mentioned above, S 52 no. 37 (with fig. 20, drawing): Theodore I Lascaris (1204–1222).

Name: Called in the inscription Πύργος Χαλάνης, i.e. "Tower of Babel" (S. *ad loc*), but this may be merely a poetical expression. The Lascarid tower evidently replaced the so-called Tower of Gonatas, which had acquired its name, according to Anna Comnena XI.i, because it had been undermined during the revolt of Bardas Sclerus against Basil II and had seemed to be bending its knee (*gonu*). The tower was the scene of heavy fighting during the siege of Nicaea by the First Crusade when it was destroyed.

T106B: (Fig. 49) Buttress built against the corner of the wall with a facing entirely of roughly coursed spoils with an irregular alternation of large squared blocks and long thin ones [F3]; several of the spoils are gravestones of the Seljuk period inscribed in Arabic; mortar [H] with varying proportion of small brick and stone inclusions; much pink surface mortar over joints. Formerly had a superstructure in recessed brick, apparently [B1].

Illustration: S pl. 47 (plan), 48 (views); Foss (1982) 198 fig. 31.

Date: Good arguments in S 41f. to associate this with repairs made by Alexius Comnenus after the recapture of the city in 1097.

T108: (Fig. 50) Bonded to W107/108; brickwork [A1] with mortar [A] including an exceptional proportion of inclusions; chamber above, at level of wallwalk, entered from the east side rather than the middle of the tower, gave access to at least five tall arched embrasures (two preserved on west face, one partially on outer face, rest missing). These were later filled with alternating brick [D4] with mortar [F]. Illustration: S pl. 49.

W108/110: (Fig. 51) Probably a rebuilding [C2] with great quantities of pink mortar filling the joints between the stones and rising above the level of their surface.

W110/111: Facing in 'covered' brick [B4] with one or more brick courses exposed between each row of fieldstones; heavy coating of pink mortar covers much of the rubble, leaving only central part of most stones visible; it also covers many additional partial courses of brick which have been laid parallel to the main courses to fill gaps left by the rubble. Mortar [F]. In the middle, near the top, a cross in brick.

W111/112: (Fig. 52) Elaborate 'covered' brick [B4] with single, double or triple courses of brick, mostly reused and broken; in the upper part, three bands of cloisonné in

which the vertical bricks do not touch the horizontal; then, above a brick band, three rows of a herringbone brick decoration. Everything thickly covered with pink mortar which conceals much of the rubble, rising above the level of the surface of the stones; behind it, mortar [D] with varying amounts of brick. Numerous small round beams directly below brick bands.

T112: Facing missing, but enormous number of beam holes. Lower part has mortar [A]; upper [D].

W112/113: Facing of banded masonry [C2] with bricks of triple bands closely set and separated by wide mortar joints; much pointing parallel to the bricks. Great deal of mortar on the surface covering much of the rubble and, it appears, some brick courses; mortar [E] and [F], with [A] where facing missing. This wall bonded with stub of T113, about 30cm of brick with wide mortar joints [A5]. Square beam holes in wall adjacent to T113.

T113: Base of rough spoils including column drums, much pink mortar in joints; superstructure of brick [A2] with wide separations, mortar [C1] and [C2]. Either this tower replaced one in brickwork [A5] (see above) or the surviving stub represents part of a rebuilding of the wall, extending it to fill a gap behind a surviving earlier tower.

W113/114: Basically same as 112/113.

T114: Facing of unusually poor alternating brick [D4] with irregular single courses of brick and rubble much covered with mortar. Many beams and traces of cribwork.

THE OUTER WALL

The outer wall is built in such a consistent style that there has never been any doubt that it was a construction of one period. For almost all of its course, it consists of rough alternating brick [D4] in which spoils and rubble of mixed sizes and shapes, but all small, are arranged in rough courses separated by irregular courses of brick; the courses are uniformly single, but sometimes short and inconsistent (fig. 53). Mortar is always [F]. By posterns, such as the gate between 9a and 10a, the brickwork is more regular, with straight single courses, and much mortar is added to the rubble to bring it up to a smooth surface. Square beam holes are often evident, usually in the rubble rather than the brick courses. The only sections which offer much variation to this technique are in the towers and walls around the main gates, which may be considered in more detail:

YENISHEHIR GATE

T115a: High base of mixed spoils and fieldstones, barely coursed; above it, a row of rough cloisonné. Superstructure in brickwork [A4] with numerous small round beam holes. Mortar [F] throughout.

W around Gate: Lower part mixed spoils with bands of three to five bricks and sporadic cloisonné; upper part, apparently rough alternating brick, with one or two courses of cloisonné near the top; all heavily restored.

T1a: Essentially the same as 115a, with some vertical bricks in the spoils. Illustration of gate: S pl. 9 (general view), 7 (plan).

LEFKE GATE

T42a: Lower half of mixed spoils and rubble, with fairly regular single courses of brick and frequent vertical bricks to form an irregular cloisonné. Toward the middle, spoils yield to rubble, heavily covered with plaster. Superstructure of brick [A4].

T43a: (Fig. 54) Base of rough spoils with some brick mixed in; middle: 'covered' brick [B4]; that is, single rows of rubble mostly covered with mortar which often is higher than the surface of the stones and leaves only the central part of them exposed, mixed with some cloisonné of similar style. Superstructure, brickwork [A4] with two rows of brick in herringbone pattern near the top (itself restored). Small round beam holes and mortar [F] throughout. Inside this tower, a round chamber with a dome of brick corbelling; numerous beams.

Illustrations of gate: S pl. 21 (view), 22 fig. 13 (plan).

ISTANBUL GATE

T67a, 68a: Both in same style: lower part of rough alternating brick with much mortar on surface so that it comes to resemble 'covered' brick [B4]; superstructure in brickwork [A4]. Inner chambers give access to two splayed loopholes each, entered through a rectangular antechamber with round niches on the sides; loopholes are at the level of the top of the gate. Chamber of west tower had frescoes of saints, still seen by Schneider, while the east tower was supposedly once dedicated to Saint Nicholas (references in Raby 178). According to Covel 152, the structure above the gate contained a chapel dedicated to Saint Nicholas, with many pictures of saints.

Inner face behind towers: Very regular alternation of single brick and rubble courses, with much cloisonné around the postern east of T67a; its arch outlined in brick. Wall directly behind gate largely of cloisonné [E1] partly obscured by mortar.

Illustrations of gate: S pl. 13 (plan), 14 (drawing), 17 (view).

CHRONOLOGY

It is evident from this survey of the walls and towers that the fortifications of Nicaea present a great variety of masonry styles, and that few sections may be dated by the firm evidence of inscriptions or texts. Those few, however, are sufficient to provide a foundation on which the chronology of the others may be based, for many sections may be associated with the dated walls and towers by analogy, using both the masonry and mortar as criteria. Masonry is a generally accepted means of dating late antique and Byzantine buildings; and its suitability for the present study will, I hope, have been demonstrated in the discussion of the walls of Constantinople. Mortar, however, is not such an obvious criterion, for its composition could as well be determined by the materials at hand in the various parts of the city where the walls were being built, or by the differing practices of construction gangs, as by changes to be associated with the passage of time. Before a general discussion of chronology, therefore, it will be necessary to consider the validity of the use of mortar for dating and to see whether different types may be associated with datable styles of masonry; or whether the variations are merely random. The discussion which follows deals only with Nicaea. While styles of masonry may appear over a wide area to reflect visibly the architecture of the day, there seems no reason to believe that a humble and largely unseen material like mortar would have a style recognisable in many places. The mortar will naturally be composed of raw materials at hand, and may thus be expected to vary considerably from one place to another according to the presence and nature of the ingredients which compose the aggregate and inclusions, and the availability of old building material to be reused. Any conclusions reached for Nicaea, therefore, need not be applicable to other sites.

MORTAR AS A CRITERION (See Table III, p. 119)

The mortar of the Nicene walls has been classified into nine main types according to provisional criteria which may stand in need of revision. There are in addition many minor variations which will not be treated here because their occurrences are too few to enable them to be associated with a particular type of masonry. In most cases where numerous instances of mortar have been recorded, as will be seen, a correlation between mortar and types of masonry may be established.

Mortar [A], rough and sandy on the surface, smooth and lighter in the core, is associated in the great majority of recorded cases with brickwork [A1] and banded masonry [C1]. It occurs in one instance each with masonry [A3, C7, F6 and F7], usually in towers and walls which represent rebuildings. Conversely, brickwork [A1] seems always to use mortar [A] — no exceptions have been noted — and masonry [C1] is almost invariably accompanied by it, with the few exceptions associated with rebuildings. It is thus clear that mortar [A] is characteristic of masonry [A1] and [C1], and to be associated with them and the period they represent.

Similarly, mortar [B] occurs in conjunction with the fine spoils of [F1], and only once elsewhere, in W 54/55. Masonry [F1] uses this mortar exclusively. The two may therefore be associated and considered contemporary.

Brickwork [A2] and banded masonry [C4], with one possible exception, always use one of the variations of mortar [C], which also appears in association with banded masonry [C1] and bases of spoils [F6] and [F7]. These bases, when they use this mortar, normally have a superstructure in brickwork [A2]. This suggests that the varieties of [C] are not diagnostic: that is, the inclusions may be quite differently composed without affecting the definition of the type; and that mortar [C] and brick [A2] are definitely to be associated.

Brickwork [A4] and the towers and curtain of the Outer Wall always use mortar [F], which thus seems characteristic of a period of known date. This mortar also appears in conjunction with masonry [A3, B2, B4, C2, D2, D4, D7] all of which are evidently late styles, since they appear in rebuildings.

The use of mortar [H] seems confined to recessed brick [B1]; it appears only once in [F6], the base of W 48/19, a wall which may have had a superstructure in recessed brick.

For the rest, the situation is somewhat more complicated, but a certain pattern does emerge. Brickwork [A3] occurs with mortars [D, E, F, G]; covered brick [B2] with mortar [E, E2, F, G]; covered brick [B4] with [D, E, F]; banded masonry [C2] with mortar [B, E, F]; alternating brick [D2] with [C1, E, F] and alternating brick [D4] with mortar [E] and [F]. In all this, mortars [D, E, F] appear to be closely associated, and only rarely overlap with [A, B, C]. The masonry which employs them is certainly all late, for it is used in rebuildings. It is therefore possible in these cases to identify mortars [D, E, F] as characteristic of a late period to be defined.

This evidence shows that a type of mortar is usually to be associated with certain kinds of masonry and not with others; it can have the same kind of value for establishing chronology as masonry. In some cases, however, the value is more limited, since more mortars appear with several kinds of masonry; but even there, connections may be established and the mortar used as a criterion, if less precisely. To some degree, the problem of the "late" mortars [D, E, F] may be one of classification, since they often resemble one another, and the apparent differences may be of less significance than at first sight appeared. Further research might do much to clarify this kind of question. In the meantime, the mortar type may be used as a criterion

for dating to a varying degree of accuracy and always to be employed in conjunction with the evidence of masonry.

ABSOLUTE CHRONOLOGY

In several cases, a precise dating may be established by inscriptions or texts, some of which have not previously been associated with specific parts of the walls. These will be considered in chronological order.

c260–269 (figs. 3, 24, 26, 38)

The inscriptions of the Yenisehir and Lefke Gates, of which the first partially survives *in situ*, show that the walls were completed in 268 or 269. The surviving inscription stands on a largely destroyed pillar of well-cut spoils which corresponds to the structure of the main gate, itself in fine ashlar spoils laid with little or no mortar [F5]. This stonework, which is quite distinct from other masonry of spoils, may be taken as characteristic of the original walls. It appears also on the base of several towers and sections of wall between the Lefke and Istanbul Gates, where it most frequently has a superstructure of masonry [A1]. This masonry, with its neat brickwork, is often found bonded with walls of banded masonry [C1]; both use the rough sandy mortar [A]. Both have already been identified, by Schneider, as the masonry of the original walls of the third century, an assumption which may be accepted without hesitation. Dating of these styles is confirmed by the phenomenon that neither of them ever occurs in a rebuilding, but rather are frequently the subject of later modification. Many sections of the wall and numerous towers, therefore, may be taken to represent the original form of the fortifications of Gallienus and Claudius Gothicus, and to attest the skill of the Roman builders whose work has stood for so long in good condition.

c730 (figs. 27–29)

The inscription of T71 indicates that it was built by Leo III and Constantine V after the Arab attack of 727. Since this tower and its immediate neighbours are in a uniform style with carefully arranged marble blocks [F1] set invariably in mortar [B], it is evident that they formed part of the same project of reconstruction. Masonry and mortar are both so distinctive and unusual that other occurrences may be associated with the same rebuildings, whose extent is not specified in the inscription. These include T94 with the lower parts of the adjacent wall as far as T96, and the spur wall between T89 and the lake shore (fig. 36). In addition, it is possible to connect the walls with new wallwalks and balustrades of spoils of this period (fig. 14) because of the distinctive use of neat and well-fitted spoils which do not appear in other known times. Confirmation of a relatively early date is provided by the relation between these battlements and evidently later towers which were built against them, leaving the battlements to run uselessly behind. Although several instances of this include towers of the thirteenth century, some, notably T17, T102 and perhaps T64, show that towers of the ninth century (this date will be determined immediately below) block these ramparts. The reconstruction of Leo III may thus be seen as extensive rebuilding near the Istanbul Gate, work on a somewhat smaller scale near the South Lake Gate, construction of the wall joining the southwest corner with the lakeshore, and the general raising of the walls which particularly affected the southern and eastern parts of the circuit. Some of this work responded to damage inflicted by the Arabs, other parts perhaps to a challenge of nature: the walls were quite probably raised to compensate for increased ground level as well as Arab damage to earlier battlements, and a similar phenomenon may have provoked a filling on the lake and slight recession of the walls from its shore. In that case, the southern spur wall (and perhaps the northern which has disappeared) would have served to prevent the enemy from approaching the base of the walls by the lake.

857/8

Michael III carried out a rebuilding whose large extent is attested by at least eight inscriptions, each of which identified a tower as the work of the emperor. Identification of the towers has been problematical since none of the inscriptions was found in *in situ*. One of them, however, was discovered reused as the threshold of a modern opening in the wall between towers 96 and 97, a location which led to the suggestion that towers 97–100, all in a similar and distinctive style of banded masonry, some with a superstructure of brick, represented the work of Michael III (fig. 44). Resemblance between them and dated towers of Michael III in a similar banded masonry at Ankara seemed to confirm the proposed chronology. The towers in question employ banded masonry [C3] and brickwork [A2] in superstructure and bands. Subsequent publication of the description of Nicaea by Covell has indicated a more precise provenance for the inscriptions which could still be seen on the towers in the seventeenth century.¹⁰ Covell found two of them between towers 94 and 106, one on the ground and one on a round tower, and remarked that Michael was responsible only for repairs, not a complete reconstruction, since the appearance of the towers was ancient. A third inscription was on a tower between T106 and T115, in a section which contained a great deal of patching. Half the inscriptions, four in all, were recorded between the Yenisehir Gate and T19, while the last was between there and the Lefke Gate. Covell's description is sufficiently specific that these provenances may be accepted as certain and thus as potential evidence for chronology. Although none of the inscriptions may be associated with a specific tower, the general locations given are highly significant. The two which stood between towers 97 and 106, one of them on a round tower, confirm the identification of T97–100, all of which are round. More important are the four inscriptions of the southern wall between towers 1 and 19. This section is still very well preserved and offers a peculiarity long noted: alternate towers are additions, built with bases of spoils and not bonded to the wall (fig. 4). The other, original, towers do not display sufficient evidence of rebuilding to suggest that four of them could have been called towers of Michael III. The inscriptions clearly refer to the added towers and, since these are also well preserved, to their original state and not to later rebuildings. The narrative of Covell, therefore, has revealed an unexpectedly large number of towers rebuilt in the ninth century to put the work of Michael III in a different perspective. These added towers had previously been attributed to the fourth century on the grounds that their brick technique strongly resembled that of the original towers and that the earthquake of 368 is known to have inflicted severe damage on the city.¹¹ In fact, the brickwork [A2] of these towers is quite different from that of the original structures: it employs slightly larger bricks, often reused, and set in uneven rows without the vertical pointing characteristic of [A1]: compare figures 8 and 9. When these towers were built, the ground level had risen by about two metres, a phenomenon far more compatible with the lapse of six centuries than of one. The alternate (even-numbered) towers of the southern wall, all originally in brickwork [A2] with mortar [C] and bases of spoils well or poorly arranged [F6, F7] are therefore to be considered the work of Michael III. When they are compared with towers 97–100, some resemblances are obvious: the later also employ brick [A2] and bases of rather rough spoils. These elements are sufficient to link them together in spite of their quite different appearance, which again raises a problem noted at Constantinople. Here, too, imitation may be seen as an important factor in determining the style of construction. When new towers were to be built between old ones of a well-defined style, they followed the model at hand as closely as possible, though making use of more 'modern' techniques, just as at Constantinople the builders continued to erect towers in banded masonry for centuries in the Theodosian walls. In the southern wall, imitation was important, but in the southwest section the repairs of the eighth century had apparently so changed the appearance of the walls already that the builders felt free to follow a style of masonry more appropriate to their own time.

For the attribution of the other inscriptions of Covel, some suggestions may be made. T113 is of brickwork [A2], the only one in the appropriate section. It, too, may be considered the work of Michael III, and the probable site of the inscription. No certain location can be established for the other, found between T20 and T42; but the section T32–37 displays the same phenomenon as the south wall, with alternate towers on bases of spoils added to the original wall. These, too, would seem to be of the ninth century. In general, it seems reasonable to associate all towers and walls in brickwork [A2] or banded masonry [C3] with the repairs of Michael III. Since these occur almost universally with mortar [C], this may also be considered characteristic of the period.

1065

A.M. Schneider suggested that towers in the recessed brick technique [B1] (fig. 21) were to be associated with the earthquake of 1065, which is specifically stated to have destroyed a part of the walls. He based his reasoning both on the form of the repairs in this technique – they are wider at the top than the bottom, forming a kind of triangular patch associated with damage by earthquake – and on relative chronology: he found evidence that the masonry must be earlier than the thirteenth and later than the eighth century, and noted that it appeared in Constantinople from the end of the eleventh. Although recent researches have shown that recessed brick was used over a wider period than previously supposed, it seems to have originated in the late tenth century, and was in common use in the eleventh.¹² The proposed dating, therefore, may be considered satisfactory, with the proviso that not all towers in that technique need be associated with the earthquake, but could be somewhat later, as will be seen in the following example.

c1100

The corner bastion 106B (fig. 49) at the southernmost point of the fortifications has been dated by Schneider to the period immediately following the First Crusade.¹³ During the siege of 1097, the Crusaders concentrated their efforts on the southern wall, and in particular on a tower called Gonatas because it had been “brought to its knees” and was leaning as a result of damage inflicted a century earlier. The Crusaders finally undermined the tower, thus leaving a strategic breach at a particularly vulnerable part of the circuit. The bastion 106B is made entirely of spoils which seem hastily slapped together and include several Turkish gravestones. Schneider reasonably concluded that it had been built to strengthen the wall at the point where the tower had fallen. It seems, in fact, to correspond in style to other fortifications of Alexius Comnenus, and may thus be datable to about 1100.¹⁴ Ultimately T106, which provided full protection for the corner, was not built until the reign of Theodore Lascaris. The bastion formerly had a superstructure in recessed brick which has not survived; it provides confirmation of the period when the style was in use, and suggests that other examples of it could belong to the Comnene period.¹⁵

1208

Inscriptions show that the large square towers, T19 and T106, were built by Theodore Lascaris; that which stood on T19 and is now lost gave the date. These have in common a base of spoils which reaches to mid-height and a superstructure in brick [A3] with chamfered mortar (figs. 10, 47, 48). T19 has a brick frieze, while the decoration of T106 is more complex, with bands of brick and an extensive cloisonné whose surface is largely covered with pink mortar. Both have square beam holes arranged in regular rows; those of T106 are somewhat larger. T19 uses a fine white mortar [G] with few inclusions; this also appears in T106, along with greyish mortars [E] and [E2]; that is, the mortars of that tower are grey to white with varying amounts of brick and stone. In general, these towers are distinguished by their high bases of spoils, the

chamfered mortar, and the varied brick decoration. Another inscription, now lost, stood on the northeastern part of the walls, between T49 and the Istanbul Gate; it cannot be associated with certainty with any of the towers standing there.

1222/1253

The encomium of Nicaea by Theodore Lascaris proclaims that his father John Vatatzes was responsible for the greatest rebuilding of the fortifications, in which the outer wall was added and the inner wall raised. The outer wall is in a uniform masonry of rough alternating brick [D4], executed more carefully by the posterns, where regular single courses of brick appear (fig. 53). At the gates, the work is more elaborate, with bases of rough spoils, irregular cloisonné or covered brick [B4], a superstructure in brick [A4] composed of reused and broken brick, and sometimes brick in a decorative herringbone pattern (fig. 54). Gates and walls use mortar [F] consistently; beam holes are usually small and round in the towers and square in the walls. The raising of the inner wall was carried out in alternating brick of varying appearance, some quite regular [D2], other parts rougher, [D4] in the style of the outer wall. They use grey mortars [E] and [F]. The walls of Vatatzes are thus characterised by the alternating brick of poor appearance [D4] usually with mortar [F], and with much more careful, sometimes quite elaborate work by the gates.

DATING BY ANALOGY

A few towers may be dated by comparison with masonry in a similarly distinctive style elsewhere. Many more are to be associated with one of the types of masonry at Nicaea whose chronology is already known. These will be discussed after the first group according to their type of masonry.

The secondary facing of tower 83, in alternating brick [D1] using thick bricks (fig. 32), decorated by a frieze, and employing mortar [E] has been associated with similar masonry in western Asia Minor which may be assigned to the Comnene period, and in particular to the reign of Manuel. The general characteristics of this tower appear in the walls of Pergamum which are assigned to Manuel by an historical text, and in others which may reasonably be attributed to the period. While regional variations might make it difficult to determine a close dating by analogy, a date in the twelfth century seems most probable.

The complex banded masonry [C9] of T84, with its rhythmical alternation of brick and stone (fig. 33), finds its closest analogy in the stonework of walls and churches at Constantinople of the Palaeologan period, and in particular of the late thirteenth century.¹⁶ When fully developed, the kind of pattern which appears in this repair is so distinctive as to resemble work of no other period. The attribution to the late thirteenth century thus seems assured.

Another tower facing the lake, T88, is in a similar style (fig. 34). It makes use of a complex alternation of brick and rubble C8 with thicker bricks than T84, and a less regular pattern of alternating courses. Its general characteristics seem to suggest a less developed style and therefore perhaps an earlier date than T84 but still, according to the criteria mentioned, within the late thirteenth century. Known historical circumstances may suggest a more precise date for one of these towers. The emperor Andronicus II, who presided over the loss of Byzantine Asia Minor, made a tour of inspection in the surviving Anatolian provinces near the beginning of his reign, in 1290–1293. In the course of it, he devoted special attention to the defence of the frontier and construction of fortresses along its length to ward off the increasing pressure of the Turks. His first long stay was in Nicaea, where he received the speech of Theodore Metochites in praise of the city in 1290, a speech which specifically describes and lauds the

walls. It seems possible that the emperor's stay was the occasion for a partial rebuilding of the circuit which could have repaired the tower prominently situated next to the Lake Gate, or have constructed the no less conspicuous T88; by stylistic criteria, the former is perhaps more probable.¹⁷

Several sections of walls and towers are constructed in styles similar or identical to those already discussed. In these cases, the association will naturally provide an accurate chronology; they will be discussed in order of their masonry types.

Michael III, as noted, carried out extensive repairs to the southern and eastern sections of the walls, usually in a distinctive brickwork [A2]. This occurs almost exclusively in association with mortar [C] which itself may be considered characteristic of the mid-ninth century. In that case, the banded masonry C4 which always uses that mortar may be assigned to Michael III. This occurs on the inner face of the wall between T95 and T99, using double brick arches filled with banded masonry (fig. 45). Since both arches and filling use one of the variations of mortar [C], they may be considered as part of the same construction, with the banded masonry intended as strengthening for the arches which would have supported the wallwalk. The whole inner wall, to judge by the cross-section visible next to T97, was intended as a reinforcement for the original wall, which was here exceptionally thin.

Brickwork [A3], which is distinguished by bricks closely set in straight rows with pointing parallel to them (fig. 6), is evidently a characteristic of the time of Theodore Lascaris, since it appears in T19 and T106, erected at the beginning of his reign. One of these has a brick frieze, both use chamfered mortar; T19 has mortar [G] throughout, while T106 uses [G] as well as [E] and [E2]. This brickwork appears in several places as a repair to an earlier tower (the type of mortar used in each appears in brackets): T7 [F], T9 [E], T16 [D], T18 [D] with double frieze, T48 [G] with frieze, T68 [D], and T93 [E]. In addition, two towers, T26 and T89, which are built against and over the wall and use mortar [E], have the same brickwork. These examples may thus be taken to show that the activity of Lascaris was more extensive than has been supposed.

The peculiar 'soft' appearance of brickwork [A4], which comes from its use of broken brick in a thick bed of mortar, distinguishes it from any other (figs. 11, 16). Since it occurs in the gates of the outer wall with mortar [F], which is characteristic of that whole circuit, it is to be assigned to the reign of John Vatatzes. Thus, the outer shell of T20 as well as the decagonal tower 23 which rests on the wall may be attributed to his reign both by their brickwork and by their use of mortar [F].

The elaborate alternating brick with cloisonné [B4] occurs in several places in somewhat varying forms of which some will be considered below. In the wall between T110 and T111, this masonry has a heavy coat of mortar on the surface, and between T111 and T112 appears in conjunction with a herringbone decoration as well as cloisonné (fig. 52). Since these are characteristics observed in the Lefke Gate of the outer wall, these sections may be dated to the time of Vatatzes. The use of mortar [F] in the first section may be considered as offering confirmation, while the use of mortar [D] in the other does not contradict the attribution, since these mortars frequently appear together in late walls. These rather elegant versions of this masonry are found on the south wall not far from the Yenisehir gate. East of the gate, between T10 and T11 is a far rougher and less regular version (fig. 5). This, too, by its resemblance to the adjoining section of the outer wall, and its use of a mortar resembling [F] would seem to represent a repair of the mid-thirteenth century.

Two types of banded masonry offer less certain possibilities of dating. Masonry [C5] with large

blocks of spoils and some column drums separated by brick bands and some very narrow cloisonné (fig. 40) resembles in its general characteristics the base of T106, built by Lascaris. Here, however, the work is much cruder, quite probably because the inner face of the wall (where it occurs between T94 and T95) was far less important and conspicuous than the great corner tower. This masonry also bears some resemblance to that which appears in the towers of the outer wall adjacent to the Yenisehir and Istanbul gates, where a base of rough spoils and fieldstones is associated with cloisonné, but there, stonework and cloisonné alike are less regular than in the present case. The wall in question uses mortar [G] which appears *inter alia* in the Lascarid towers 19 and 106, and in association with Lascarid brickwork [A3], as well as in some other clearly late contexts. The section of the wall near the lake between T78 and T79 is built in a rough banded masonry [C7] which has bands of five or six bricks, with extra brick courses inserted among the rubble (fig. 31). This has no exact parallel at Nicaea, but its resemblance to walls of the Comneni and Angeli at Constantinople suggests a date in the late twelfth century.

The wall between T89 and T90 (fig. 37), in alternating brick [D1] with thick bricks and mortar [E] is evidently in the style of T83 and may also be attributed to the second half of the twelfth century. Two other forms of alternating brick [D2] and [D4], the latter apparently a less careful version of the former, use mortars [E] and [F] and are to be assigned to Vatatzes by their frequent appearance in added superstructures and in the outer wall. In some cases, however, it is evident that a rough form of [D4] in which fragmentary bricks form partial courses amid barely arranged rubble was in use at a much later date. This is clear in T28, where it appears as reinforcement to a superstructure in [D2], apparently of Vatatzes. In T97, three late periods may be identified (fig. 44): the upper part of the tower is in brickwork [A3], typical of the time of Theodore Lascaris; one of its merlons has been replaced in an alternating brick [D2] which may belong to the repairs of Vatatzes; and the crenellations have been blocked and the tower raised in the rougher [D4], which must therefore be later. Most notable is the case of T84, where crenellations have been blocked and the tower raised in a similar way (fig. 33). Since the parts of the tower especially affected are of Palaeologan date, the final repair should belong to the last period of Byzantine rule, probably in the fourteenth century, and show that the towers were still being reinforced and raised a century later than has been supposed.

Cloisonné occurs in various contexts at Nicaea. Where it is used alone, as in T47 and in the inner face of the outer wall by the Istanbul Gate, it appears to be the work of Vatatzes. The latter may be so dated as forming part of the outer wall, the former by its use of the characteristic mortar [F].

CHRONOLOGICAL PROBLEMS

There remain at Nicaea many types of masonry which have not yet been attributed to a period because they differ in some respect from walls and towers which may be dated directly or by analogy. In many cases, a chronology may be suggested by comparison, or by analysis of the context. In others, problems will remain, although some hypotheses can be offered. They will be treated according to the type of masonry.

The bricks of brickwork [A5] which occur in the facing of T15 are laid in straight but uneven rows with wide separations and wide mortar joints, and contain two courses of exceptionally thick bricks (fig. 7). The bricks are set in mortar [E] and cover a filling of broken brick which appears to have been thrown in roughly with a great deal of mortar. The base is of large broken spoils set in mortar [D]. Similar masonry appears in the stub of a tower behind the present T113, a small projection bonded to the adjacent wall 112/113 which is in masonry [C2]. In this, the

bricks of the bands are very closely set with wide mortar joints and much pointing parallel to them. The arrangement of these bricks is so similar to that of masonry [A3], especially in the distinctive use of parallel pointing, that the wall is likely to date to the Lascarid period and with it, the adjoining stub of the tower. Similarly, the jumbled filling of T15 most strongly resembles that of T94 which uses mortar [E2] and represents not the original eighth-century construction of the tower, but a rebuilding probably to be associated with the adjacent Lascarid wall 94/95. It would seem therefore, that the brickwork [A5] represents another variation of the Lascarid period.

Clearly associated with this is brickwork [A6] which has such wide mortar joints that it resembles recessed brick, but plainly lacks the intermediate hidden courses of that technique (fig. 20). It occurs on T29, where it is set in mortar [G] which, as noted, occurs with Lascarid brickwork [A3] and in other late contexts. The tower itself contains no other chronological indication, but the resemblance between this brickwork and recessed brick suggests a connection between the two.

Good evidence shows that much of the *recessed brick* [B1] at Nicaea is to be associated with the earthquake of 1065 and the repairs of Alexius Comnenus after the First Crusade. There is no reason to suppose, however, that such a technique, which long remained in use elsewhere, was here confined to a relatively short period. At least one instance of it seems certainly to be later than the eleventh century. The superstructure of T22 has a facing in recessed brick once attached to the core by an exceptionally large number of beams (fig. 15). It uses mortar [D] rather than [H] which is usually characteristic of this style. The recessed brick extends into an embrasure where alternating courses of brick, though themselves recessed, are not covered with mortar. This in turn continues without interruption into the inner face in alternating brick [D3], which has neat single courses of brick and relatively narrow bands of rubble. If these rubble bands were covered with mortar, the rough inner face would bear a striking resemblance to recessed brick. It is clear in this case that three distinct types of masonry form part of the same structure and are thus contemporary. Two of them have parallels elsewhere in the walls: the uncovered recessed brick appears in T19, built by Theodore Lascaris, and the rough alternating brick is virtually identical with [D2] used in the general raising of the walls by Vatatzes. The present recessed brick, therefore, would appear to be of the Lascarid period, a date compatible with the use of mortar [D]. It thus provides another example of the great variety which characterises walls of this period, notable particularly in the outer wall, whose gates and posterns differ considerably from the rest. The superstructure of T22 represents a phenomenon seen at Constantinople as well as Nicaea: far more care is usually directed to the appearance of exposed outer faces than to the generally invisible defensive chambers (which were in any case often covered with frescoes) or to the inner faces of the walls toward the city.

Further anomalous examples of recessed brick appear in towers 37 and 38. In the former, the lower courses of brick are not recessed at all, but contain a row of exceptionally thick bricks separated by small vertical brick fragments to form a kind of cloisonné (figs. 21, 22). About a metre above present ground level, this yields to recessed brick with somewhat irregular courses. In the lowest mortar band, a brick course is partially exposed rather than being set back and covered with mortar, and seems to form a transition between the two types of brickwork. There is no break; the whole facing seems unitary. The lower part of the tower offers parallels to types of brickwork already considered. The very thick bricks appear in masonry [A5] of T15 assigned to the Lascarid period, and the row of very narrow cloisonné bears some resemblance to that of the inner face of W94/95 for which convergent evidence suggested a Lascarid date. T38 displays a similar peculiarity: although most of the facing is in recessed brick,

a section near the base appears to lack brick altogether — it is presumably covered with mortar — and in many places the brick courses are not recessed; it uses mortar [E2]. The mortar is typical of a late period; the irregularity is reminiscent of T37; and the lack of brick finds parallels in the south and southeast sections of the wall. Between towers 20 and 26, the masonry [C2] resembles the original work of the third century, except that the brick bands are less regularly executed with the joints sometimes very wide, and bricks often omitted altogether to be represented merely by the lines of the parallel pointing normally found here. This pointing suggests a Lascarid date for these sections of wall, a chronology compatible with the adjacent towers, all of which from 21–26 have been assigned to the Lascarids. It thus appears that the irregular recessed brick of T38 may also be a product of this period.

These examples indicate that recessed brick was as much a characteristic of the thirteenth century as of the eleventh at Nicaea, but whether this represents a continuous tradition or a revival cannot be determined without detailed analysis of all surviving occurrences. For the moment, revival seems more probable because none of the identified examples of twelfth-century masonry display this technique. Recessed brick and the brick with wide mortar joints which so resembles it are apparently contemporary, the latter perhaps representing an imitation of the former, producing the same appearance by less complex and presumably cheaper means. Tower 37 and 38 may indicate a mixture of the two styles and perhaps a hesitation between them. The whole group suggests the emergence of a complex of masonry types during the Lascarid period.

'Covered' brick [B2] is clearly related to the preceding by its appearance. It uses single courses of brick separated by thick bands of mortar which largely conceal the intervening rubble (fig. 41). Where the mortar is sufficiently thick, the masonry bears a striking resemblance to recessed brick. Its nature, of course, is fundamentally different, for here the bricks are levelling courses between layers of fieldstones, and there is no question of intermediate recessed brick or of the exceptionally thick mortar bands of [A5] and related types. This style poses special problems because none of its occurrences, which will be considered here in order of their appearance in the wall, offers any direct evidence for dating.

W36/37 uses this masonry in conjunction with some rather inconsistent cloisonné in the upper part, all set in mortar [E]. The upper part of the following section, W37/38, is more complicated; it contains a band of three apparently recessed bricks and decoration in the form of a brick cross and inset roundels. Since these rebuildings occur in association with towers 37 and 38, discussed above, and use the late mortar [E], they may have been part of the same project of restoration, and be considered as Lascarid work. The similar section W41/42 which also uses mortar [E] offers no further chronological indication.

A poor version of this masonry appears in tower 46, where a new facing has replaced the original (fig. 24). Mortar covers the bricks almost as thoroughly as the stones, leaving an irregularly smooth surface punctuated by single or double courses of brick and numerous small round beamholes. Its use of mortar [F], characteristic of the outer walls, suggests a construction of Vatatzes. At first sight, this seems to differ notably from other work of that reign, yet, if the mortar coat were removed, the tower would look much like those of the outer wall.

More problematic are the examples in the southeastern part of the circuit between towers 94 and 98. The first section, W94/96, displays single or double courses of rather thick broken brick separated by rubble covered with a thick coating of mortar (fig. 41). Many small round beams are still visible throughout. W95/96 has a double brick frieze near the top and uses mortar [G], while W94/95, which is basically the same, has mortar [E2]. The virtual identity of the masonry makes it unlikely that the variations of the mortar are of any significance, especially since both

types are known to be late. In places where the mortar is missing, this masonry is hardly distinguishable from the rough alternating brick [D4] or from the similar style [D1]: compare, for example, figs. 37 and 42. Their context only shows that the walls in question are later than those of the eighth century which they repair. The mortars and general resemblance to the masonry just discussed suggests a late date, perhaps the thirteenth century, while the apparent resemblance of this to [D1] and [D4] would indicate a Comnenian or Lascarid date. Friezes appear in towers 83 of the former and 19 of the latter period. The final section, W97/98, differs in no major respect from these: it uses mortar [G] and is evidently later than the inner wall with arches of the ninth century which it reinforces. The inner face of this wall contains repairs in alternating brick [D2], much neater than most examples of this usually mid-thirteenth century masonry; in strongly resembles the outer face without the mortar coating and is probably contemporary with it.

Between these, W96/97 is in a rather more elaborate version [B3] of this covered brick (figs. 43, 44). Its base of spoils contains some vertical brick, though not a regular cloisonné. Most of the wall displays an elaborate alternation of single, double and triple brick courses, with single rows of heavily plastered rubble between, and small square beamholes usually below a triple brick band. The upper part of the wall, now visible only adjacent to T96, had a double brick frieze with a decorative row of brick lozenges directly below it separating the 'covered' brick from the plain brick superstructure. This superstructure is bonded with T96 whose masonry [A3] should be of Lascarid date; the wall is therefore contemporary. Such a date would suit the decoration, as well as the vertical brick among the spoils. This section may have been more richly decorated than the others because it was associated with the major project of building T96. Although not adjacent to a gate (where extra decoration may be expected in this period), it was perhaps the centrepiece of a series of repairs represented by the walls considered, whose final section, W98/99, was in the same style as these walls. It therefore seems likely that the whole wall between towers 94 and 99 represents another Lascarid rebuilding or series of rebuildings, for, strictly speaking, the contemporaneity of the sections cannot be demonstrated.

A final wall in covered brick provides the most elaborate and decorative example of the style, [B4]. It appears between towers 88 and 89 and consists of cloisonné followed by triple courses of brick in the lower part, and single or triple brick courses separated by single, double, or triple rows of heavily plastered fieldstones in the upper part (fig. 35). The surface mortar is often so thick that the rubble is hidden. The topmost part consists simply of a single brick course and much rubble barely arranged in courses; this is perhaps the same masonry without the mortar coat. The wall uses mortar [E] and has cribwork behind represented by round beamholes in the brick courses. The masonry has no precise parallels, but some of its elements appear elsewhere. The use of cloisonné in conjunction with triple brick bands appears in W111/112 [B4] and T106, both Lascarid. Here, however, the vertical bricks of the cloisonné touch the horizontal to form regular squares, while in the others there is a gap between the bricks which gives a distinctly different appearance: compare fig. 35 with 52 and 54. The technique here called 'covered' brick, in which fieldstones, but not courses of brick, are covered with mortar seems in general to belong to the Lascarid period. In no other example, however, do such wide bands of mortar appear. The closest parallel is not at Nicaea, but at Constantinople, where a complex masonry of similar kind occurs between towers B13 and B14 of the Blachernae wall. This employs a great deal of regular square cloisonné alternating with bands of brick; if the plaster of its facing were preserved, it would have a striking resemblance to the lower section of the present wall. These parallels suggest a date in the late twelfth or early thirteenth century, before or after Nicaea became the imperial capital.

The general category [C2] includes several types of *banded masonry*, often used in the walls

in close imitation of the original work of the third century. One long section covers the southeastern part of the circuit between towers 20 and 28, where all the surviving towers are Lascarid structures. As already noted, most of this section, from T21-26, may also be attributed to this period by the arrangement of its brick bands. W20/21 may be contemporary since it uses relatively few bricks and much mortar, but it lacks the characteristics specific to the period. W27/28, which has bands of recessed brick with a great deal of mortar over the stones, could also be of Lascarid construction; both features are found in the period. W108/110 with bricks set fairly close together, relatively wide mortar joints, and a great deal of mortar on the surface (fig. 51), may be a final example of Lascarid work, since it has the characteristics observed in that period; it closely resembles W112/113 for which a Lascarid date has been postulated; and is adjacent to W111/112 which seems specifically to date from the time of Vatatzes.

The remaining example, W54/55, has been assigned by its mortar to the eighth century. Taken with the other sections, it confirms that builders of all periods were careful to imitate the original walls and suggests that a closer inspection of walls attributed to the third century might reveal further examples of rebuildings difficult to distinguish from the original.

The superstructure of T76 [C6] has bands of four bricks separated by two or three rows of rubble (fig. 30), all set in mortar [E2]. The surviving face continues around a corner, bonded with a stub which seems to have considerably wider brick bands. The work would at first appear to be part of the thirteenth-century raising of the walls, especially since this has the characteristic large embrasure of the period. That project, however, seems universally to have been executed in alternating brick. The closest parallel for T76 is the banded masonry [C7], evidently of the Comnene period (fig. 31). Since this superstructure seems to have been added at a time when the tower was in disrepair, it is probably to be seen as a rebuilding, perhaps due to an earthquake, in the twelfth century.

The complex facing of brick and stone of towers 50 and 58 (fig. 25) contains an alternation of cloisonné and brick bands in a highly varied pattern [C10]. The vertical and horizontal bricks of the cloisonné do not meet, and the field stones are heavily plastered. In both cases, the facing is very superficial and appears to contain few beam holes, but, where it is missing, abundant beam holes reveal an extensive system of cribwork. Mortar [E2] appears in tower 50, and [G] in T58. In their combination of cloisonné and brick bands, these towers resemble W88/89, but direct comparison shows a striking difference between the regular and straightforward appearance of the latter and the rather soft complexity of the towers. Their closest analogy is perhaps in the gates of the outer wall or in W111/112, where courses of rubble are combined with various types of decorative brickwork. On the other hand, the rather feeble appearance created by the use of thin bricks and a great deal of mortar, combined with the elaborate pattern, may be reminiscent of the Palaeologan facing of T84. The mortars only suggest a late date, confirmed by the stages of construction of T58, which evidently had an earlier facing of recessed brick. According to Covel, one of the inscriptions of Theodore Lascaris stood on a tower between T49 and the Istanbul Gate; it may be possible to associate this with one of the present towers. Both would in any case be products of the mid- to late thirteenth century.

The remaining example of masonry with brick bands [C11] occurs in a curious structure, apparently a reinforcing bastion, adjacent to the Lefke Gate (fig. 23). Its brickwork is perhaps the most elaborate of the circuit. The lower part, to the level of the bottom of the loopholes, consists of courses of four or five bricks alternating with mixed spoils and fieldstones. Between the two narrow loopholes is a blind arch in brick, outlined in brick and containing a decoration of two rows of vertical bricks separated by a horizontal brick course. The brick band at this level is very wide, but inconsistent, containing as many as seven brick courses. Above it, a row of rub-

ble with some vertical brick is followed by a brick band which becomes a row of decorative brick on the projecting round tower-like structures; in this, double vertical and horizontal bricks alternate. Above this is a row of cloisonné in the centre with a decorative row of small vertical bricks on the 'towers'; and above that, a brick band. The masonry of the two 'towers' is not identical, but contains the same evidently decorative elements. The whole facing contains many square beamholes arranged in regular rows. This masonry has no parallels at Nicaea, but many elsewhere, and recent analyses of late Byzantine architecture of western Asia Minor leave no doubt that this decorative style is typical of the Lascarid period.¹⁸

The final styles of masonry cannot be dated with any certainty. The upper part of the wall between T89 and the lake shore (fig. 36) makes use of small spoils regularly arranged in courses, set in mortar [E]. As a repair to the original wall, it is evidently later than the eighth century; the mortar would suggest a relatively late date, perhaps in the twelfth or thirteenth. A particularly poor facing [G] appears between towers 19 and 20. It consists of an irregular mixture of brick and rubble, with the bricks barely arranged in courses and often set in vertically or at odd angles (fig. 11). Much of the surface is covered with mortar. This facing apparently replaced recessed brick which had fallen away from its base of large spoils to leave the wall a good deal thinner with the base still projecting. It may represent a late and poor effort to maintain the walls without extensive rebuilding, and could therefore be a product of the latest Byzantine period, or even of the Ottomans.

The results of this survey of the chronology are tabulated in Table IV, where all the occurrences which I have recorded are listed; it may be used in conjunction with Table II, which describes the masonry types. Note that it includes only examples which have been mentioned in the text.

HISTORY OF THE WALLS

Analysis of the masonry shows that most of the walls at Nicaea may be dated with more or less accuracy, and may thus be used as material for reconstructing the history of the circuit in far more detail than has been done. The following discussion will treat the sections of the wall beginning at the Yenisehir Gate according to the internal evidence of masonry; it is supplementary to the historical summary at the beginning of this chapter.

T1-20

In its original state, this wall consisted of the Yenisehir Gate with its brick superstructure, T1 (now represented by a later rebuilding), and the even-numbered towers, all in brickwork [A1] and bonded to the wall in banded masonry [C1]; none of them has a base of spoils. Most of the original work has survived, though greatly modified by later repairs.

The new balustrade and wallwalk of the eighth century, which has only partially survived here, brought the first major change. More fundamental was the rebuilding of Michael III, when the number of towers was doubled by the insertion of a new one between each pair of original towers; these are the odd-numbered towers in masonry [A2] with bases of spoils. They appear to have had upper chambers with embrasures and loopholes. The wall between towers 18 and 20 with its superstructure in recessed brick may indicate some rebuilding in the eleventh century, but too little has survived to give a dependable date.

The thirteenth century was a final period of great activity. Theodore Lascaris rebuilt towers 7, 9, 16, 18, 19, 20 and quite probably 15. Chambers with embrasures or loopholes were maintained or constructed. John Vatatzes was evidently responsible for raising towers 5 and 17, for adding the new shell to T20, and for rebuilding W10/11. This work made the towers higher and stronger and, in the case of T20, blocked most of the openings. The rebuilding of T18, in which

a circular inner chamber was added as well as superstructure in crude alternating brick [D4] affected a tower already repaired by the Lascarids and probably belongs to the fourteenth century. Other similar rebuildings may be contemporary; no certain date may be proposed for the poor inner facing of W19/20.

T21-42

Rebuildings have left little trace of the original walls, which were evidently of the usual appearance; between towers 30 and 38 and perhaps elsewhere, they had fewer towers than now appear. The balustrade of Leo III is visible along most of this wall. Michael III changed this part almost as much as the preceding by the addition of several towers, notably T32, T34 and T36, unbonded with bases of spoils; T28, T30 and T41 may be similar cases; T21 and T27 are too delapidated to show whether they are additions or repairs. This project blocked the posterns of the original towers, reducing them to vaulted passages. Later repairs have obscured the ninth-century defensive techniques. Two towers, T31 and T33, have new facings in recessed brick, probably as repairs after the earthquake of 1065.

The greatest changes came under the Lascarids, who were responsible for all the towers from T21 to T29. Theodore Lascaris apparently built towers 22, 25 and 26, which have upper chambers with loopholes and wide embrasures, while towers 23 and 24, the former with narrow embrasures and an upper platform, represent the work of Vatatzes. Other sections can only be called 'Lascarid'. These include W20/28 rebuilt in a style approximating the original, the reconstruction of T27 and T29, and much work near the Lefke Gate with T37 and T38 in recessed brick along with the adjacent walls and quite possibly T40 and W41/42. In general, the Lascarid rebuilding was so extensive as to obliterate most earlier work.

The latest repairs consist of the heavy reinforcements to the upper chambers of towers 22, 25, 27 and 28, all in crude alternating brick. Since the last of these was built against a wall of Vatatzes, the whole group may be assigned to the fourteenth century. The loopholes of T25 were blocked in a similar masonry, and the narrowing of the embrasures of T26 is perhaps also to be associated with this project. As a result, the towers became heavier, with strongly buttressed chambers, and fewer and narrower openings.

T43-66

Many walls and towers of the third century differ from the usual by being constructed on bases of extremely well-cut spoils with little or no mortar. These bases are readily distinguished from those of later periods, and perhaps reflect the presence of numerous ruined buildings in the vicinity. They are notable in most sections from T45 to and including the Istanbul Gate. Leo III built the usual ramparts of spoils, as well as some sections of the walls, e.g. 54/55, in a style very close to the original. The general poor condition of this section has left little of the ninth century, represented now by towers 44, 54 and 66 with embrasures in upper chambers, and W64/65, very similar to the third-century style. Three towers in recessed brick, T44, T54 and T58 probably show that these walls also were afflicted by the earthquake of 1065.

Lascarid work is less prominent here than elsewhere. T48 may be assigned to Theodore I, and T46 and T47, along with the raising of T48, to Vatatzes. The last has an upper chamber and defensive platform, but is in a rough style which could suggest a later date. The odd bastion behind the Lefke Gate is evidently Lascarid, but two towers, 50 and 58, may by their elaborate decoration only be assigned to this or the immediately following period.

T67-84

Half of this wall, from the Istanbul Gate to the lake is relatively well preserved; most of the section along the lake front has been destroyed or obscured by modern construction. Walls of

the third century are evident near the Istanbul Gate and toward the lake, having yielded elsewhere to reconstruction or ruin. This section contains the most striking example of Isaurian work, the towers and walls from T70 to T72, where the original walls have been covered with an elegant facing of square-cut spoils, dated by the inscription of T71. This was presumably the scene of heavy fighting during the Arab attack. The balustrade of spoils continues above the original walls where they survive. The rebuildings of Michael III have left little trace here, in T67 and the earlier facing of T83. There is no recessed brick.

With the exception of T79 (third century), the whole lake wall consists of late rebuildings, including several of a period little represented elsewhere. T83, W78/80 and the superstructure of T76 all belong to the age of the Comneni, probably to the late twelfth century; the towers contain upper defensive chambers. The thirteenth century, on the other hand, hardly appears at all — only the repair to T68 dates to the reign of Lascaris — probably because the Comnene walls were still recent and in good repair at the time. Palaeologan masonry appears in the large repair to T84, probably of the end of the thirteenth century. It, in its turn, was raised in a rough alternating brick, no doubt toward the end of Byzantine rule.

T85–114

Several towers of the original wall survive between the southeast corner and along the southern side. In some places, the wall is built on bases of spoils, but for the most part it has been completely transformed. Leo III added the spur wall from T89 to the lake, to block access to the lakefront by land. In addition, he built T94 and the adjacent wall as far as T96, perhaps in response to damage inflicted by the Arabs. Later rebuildings have removed the balustrade of spoils as far as T102, but it is much in evidence thereafter. The repairs of Michael III, which included the complete rebuilding of a long section of the wall rather than the usual addition of towers, are particularly notable between T95 and T101. Most of the new towers were built in a distinctive style typical of the age, apparently because there was no model of earlier surviving adjacent towers which had to be followed. These towers had a chamber with loopholes below the level of the wallwalk, and an upper crenellated platform. The new wall was quite thin, and reinforced on the inner face with brick arches which were filled with banded masonry. The occasion of this major project is unknown. Elsewhere, towers 102 and 113 are of the period.

Alexius Comnenus built the corner bastion 106B after the First Crusade. His successors, probably of the late twelfth century, were responsible for the walls between towers 87 and 90, further indication of a major Comnenian restoration of the lake walls.

This section contains a great deal of Lascarid rebuilding. Towers 89 and 96, both with large embrasures (those of the round corner tower 89 are particularly notable), W96/97 and the repairs to towers 93 and 102 may be attributed to Theodore Lascaris. His most significant work, however, was the construction of the new "Tower of Babel", T106, to replace the earlier tower of Gonatas destroyed in the First Crusade. This square tower, built inside the corner of the wall, is perhaps the most impressive of the whole circuit with its elaborate masonry and great vaulted embrasures. The tower was plainly intended to proclaim the power and wealth of the newly established dynasty and of their capital. Since one of the embrasures faces inward to the city, it is tempting to see this as a keep, a tower independent of the walls suitable for a last stand. It has, however, no access independent of the wallwalk, and is thus to be considered an integral part of the circuit which it dominates.

Tower 114, repairs to T89 and T95, and the addition of the massive superstructure with its square chamber to T93 are all works of Vatatzes. Other rebuildings may be assigned to the Lascarid period in general: these affected the whole area of W95/99 and W108/114 to produce a new and

decorative facing rather than a fundamental rebuilding. One tower, 88, appears to be of Palaeologan date, while other parts show repairs probably to be assigned to the fourteenth century. These include the superstructure and internal reinforcement of towers 97 and 98, in which old crenellations were blocked, and the filling of the embrasures of T108.

SUMMARY

This survey has shown that the history of the walls was longer and more complex than supposed, but also that certain precautions are necessary in reconstructing that history. *First*, the walls stood for over a thousand years, and were constantly being maintained, improved and rebuilt. As a result, their appearance was gradually transformed. Much work of earlier periods, therefore, will have disappeared in rebuildings, and later periods will be overrepresented in the surviving walls. The balustrade and wall-walk of the eighth century may be taken as an illustration: although they apparently ran around the whole circuit, they are now only to be found extensively in the eastern half, the rest having succumbed to rebuildings. The work of the Isaurians may thus have been more widespread than the surviving remains show, and the appearance of the walls after it quite different from what now appears. *Secondly*, the process of delapidation, whether caused by man or nature, has a greater effect on the top than on the base of walls and towers. Consequently, many traces of rebuildings will have disappeared and with them much evidence about the defensive techniques of earlier periods. *Finally*, the study of the walls is by no means complete; a detailed survey would yield significant results, and uncover periods not recorded here. Two, the mid-fourth and early seventh century, seem conspicuous by their absence. A.M. Schneider attributed the addition of towers to the south walls to fundamental repairs occasioned by the earthquake of 368. The present investigation, however, has found nothing of that period, perhaps because its masonry bore an especially close resemblance to the original, or because the work has been obliterated by later rebuildings. Similarly, the seventh century, which saw the devastating Persian war and the beginning of Arab attacks, is a time when repairs are likely to have been needed; these, too, have not been noted, if they existed. Bearing these problems in mind, it is nevertheless possible to determine the major stages of development of the walls.

The original walls of the late third century pose no special problems; their masonry and mortar are distinct, and traces of them survive in many parts of the circuit. Their long survival witnesses the skill of the Roman builders, but they have been so extensively reconstructed that almost nothing is known of the original defensive techniques.

No major changes have been identified before the repairs of Leo III in about 730. These had two main products, both in exceptionally fine masonry of spoils: the rebuilt towers and walls, and the new balustrades. The former are most evident near the Istanbul and South Lake Gates, where the Arabs perhaps concentrated their attacks. The raising of the walls apparently affected the whole circuit to provide an improved defensive zone and probably to compensate for a rise in the ground level outside. Finally, the spur walls which joined the circuit to the lake shore are to be attributed to the Isaurians, who left Nicaea far stronger than they found it.

This study has shown that the repairs of Michael III were extensive, including a major redesign of parts of the circuit, and considerable rebuilding elsewhere. The addition of towers to the southern and eastern walls doubled the strength of these exposed sections. The wall east of the South Lake Gate, already repaired by Leo III, was rebuilt with the addition of new walls and curtain in a distinctive style. Beside these major projects, which formed part of the program of refortification of Michael before moving on the offensive against the Arabs, many other towers and walls were added or rebuilt. Towers of the ninth century usually have inner chambers

with loopholes and upper crenellated platforms or upper chambers with embrasures or loopholes. Their masonry does not display beam holes.

The two following centuries of peace and prosperity left little mark on the walls. Only the earthquake of 1065 caused repairs to be carried out in the eastern part of the circuit, where the damage was apparently most severe, in the characteristic recessed brick of the age. This is the earliest masonry at Nicaea where beamholes appear in the facing. In the following decades of turbulence, Nicaea was captured by the Turks, then by the First Crusade. During the siege of 1097, fighting was concentrated on the southern part of the circuit, where the leaning tower of Gonatas was knocked down. The corner bastion 106B, which included many Seljuk gravestones among its spoils, formed part of the repairs after the Byzantine recapture.

The late twelfth century apparently produced a major reconstruction of the walls along the lake. Surviving parts include the new facing of T83, the elaborate brickwork of W88/89, and sufficient traces to suggest that the whole line from T76 to T90 was affected. Much of the work was so well executed that succeeding generations had little to do in this section.

The brief period when Nicaea was the capital of the empire saw the most comprehensive rebuilding of the walls, some of it in a lavish style, and a fundamental transformation of the defences. The most impressive results of the extensive rebuildings of Theodore Lascaris are the two great corner towers 89 and 106 and the square tower 19. Inscriptions of 1208 on two of them show that refortification was a major concern of the new emperor in his new capital. The towers of Lascaris, found in almost every part of the circuit, are usually in brick, sometimes with a high base of spoils and decorative brickwork or cloisonné; their tall and wide embrasures are particularly noticeable. Beam holes, representing an inner cribwork, are usually square, showing that the tree trunks or branches were sawed before being put to use. The size of the beams varied, but they tended to be set in regular rows.

John Vatatzes, the greatest builder in the history of Byzantine Nicaea, was responsible for the entire outer wall, and much raising and rebuilding of the inner where new superstructures with rectangular chambers were added in a careful alternating brick. The masonry of towers and walls displays a good deal of variety. Beam holes tend to be small and round, often covered so that few appear on the surface. They show that unhewn branches or small tree trunks were then used for the cribwork.

Several repairs and new structures may be called Lascarid without further precision. These include the bastion behind the Lefke Gate, the long elaborate sections of the southern wall between T94 and 99, and T108 and 114, as well as some towers in recessed brick. The latter appear in sections of the eastern wall where eleventh-century towers in that technique already existed, and by their evident imitation represent the same phenomenon as the towers of Michael III in the southern wall.

Two towers, T50 and T58, both faced in a distinctive pattern of brick bands and cloisonné may belong to the Lascarids or the Palaeologi, whose diminished empire left them with few resources to rebuild the walls. The latter were responsible for the elaborate rhythmical masonry of T88 and T84, both apparently of the late thirteenth century. A final project, on a larger scale, seems to represent the last efforts of the Byzantines to improve the defences of Nicaea. In it, towers were raised, their superstructures and interiors reinforced, and their openings reduced in size and number. This work, consistently executed in a rough alternating brick, indicates a major change in defensive technique.

In general, the development of the art of defence is less clear at Nicaea than at Constantinople. The walls were consistent through all periods, with only one defensive zone at the battlements,

however these were modified. The towers seem long to have had two zones, an inner chamber with loopholes, and an upper crenellated platform or chamber with embrasures. These appear in the ninth century, but probably existed earlier, and were suitable for ballista and catapult. The new towers of Theodore Lascaris have especially large embrasures which were presumably designed for heavier artillery; by that time, the narrow loopholes still being constructed would have been used for crossbows. The addition of the outer wall produced a doubling of the defences and concomitant vast increase in the manpower needed. The simultaneous raising of many towers of the inner walls reflects a unified project in which the inner wall would provide for defence at a greater distance, while the outer would cover the main thrust of enemy attack. In the final rebuildings, towers became taller and heavier, their openings fewer and narrower. This probably indicates the introduction of the trebuchet, which could strike the enemy at a far greater distance, as well as a general reduction of available manpower, phenomena typical of the latest period of Byzantine rule. If the trebuchet seems to have reached Nicaea two centuries after Constantinople, the differing needs of the two cities should be considered. The capital had always to be ready to defend itself against a great variety of enemies who, in the later Middle Ages, would include westerners with the most sophisticated methods of attack. Its walls, consequently, would reflect every innovation as it arrived. Nicaea, on the other hand, was threatened by less advanced enemies: Arabs who would rarely have heavy siege equipment on their annual raids, and Turkish tribesmen to whom the western art of war would be a novelty. The late introduction, however, of taller and heavier towers which suggest improved artillery may indicate a desperate effort to maintain control of the city against constant attack, and even imply that the Ottoman tribesmen, so often considered as unsophisticated nomads, had learned important lessons in the art of war and were in a position to make a determined assault with advanced technology on the walls of the city.

NICAEEA AND CONSTANTINOPLE

Analysis of the walls of these two cities reveals many elements in common, such as might be sought in other fortifications. These may be considered from the point of view of masonry styles, defensive techniques, and chronological problems. In any comparison which involves Constantinople, however, one central fact must be borne in mind: it was the capital and greatest city of the empire, its walls far longer and better built than any other. Since the city was the nerve centre of the state, its defences were far more essential than those of Nicaea or others, except for the brief period of the Latin empire. Consequently, great differences of scale will appear (they will not be considered here, since the relevant measurements are easily available) as will differences of technique, since Constantinople would be the first to have the latest innovations. There are, nevertheless, many similarities between the two circuits, especially in terms of masonry, which shows that similar styles were followed in both places in corresponding periods.

The walls of Nicaea were 150 years older than those of the capital and evidently built at far less expense; their third-century brick towers and rubble walls look not at all like the fine banded ashlar of the Theodosian rampart. Both, however, were constructed in the same way: the visible masonry is a facing over a core of mortared rubble, and is strengthened by bands of brick which run throughout the structure, a technique soon abandoned in both places.

The power of imitation was so strong that Constantinople long had walls of banded masonry; its walls of Leo III, for example, are thus far closer in appearance to those of Theodosius II than to the contemporary fine spoils of Nicaea. The ninth century produced walls in a new style, with brick bands alternating more frequently with stone courses [E] or with much more stone than brick [F]; both types appear in the Pteron and have a superstructure in brick. The almost

contemporary towers of Michael III at Nicaea [C3, C4] are directly comparable, with banded masonry and brick above. Comparison of the masonry clearly reveals differences in the quality of execution: provincial work may be expected to resemble more closely that of Nicaea.

There are no towers at Constantinople entirely in recessed brick; its use, however, in the repairs to tower B15 and in the brick bands of the Comnene walls show it in a period when it seems absent at Nicaea. Banded masonry with extra courses of brick appears in both places; at Nicaea, it has been dated by analogy with the capital.

The alternating brick of Constantinople corresponds with both alternating and covered brick at Nicaea, depending on the preservation or absence of its mortar coating. Alternating brick [J1] is remarkably similar to the corresponding Nicene [D1], dated to the Comneni. When covered with mortar, [J2] of the capital looks like [B2] at Nicaea, which appeared in the twelfth and thirteenth centuries; without its shelter coat, it is close to [D1], Nicene examples suggest that [J3] is a variation of the preceding, closely resembling the local [D1]. The curious and undated [J4] with its narrow courses is most like some of the [D2] used in superstructures of Vatatzes; this also provides parallels for [J6]. In these cases, comparison with Nicaea can suggest dates for masonry at Constantinople, where the twelfth century would suit the first three of these types, and the early Palaeologan period the rest.

The elaborate cloisonné with bands of covered brick [I] below the Blachernae palace, as noted, has much in common with the decorative W88/89 by the Nicene lake front. Similarly, the rhythmical alternations of tower B14 of the Blachernae find their parallel in the lake towers 84 and 88.

Some masonry has no contemporary parallel because of historical circumstances: Constantinople by definition cannot have Lascarid walls, nor can Byzantine work later than 1330 be found at Nicaea. Consequently, the rich variety of the thirteenth century is far more evident at Nicaea, which lacks the plain Palaeologan stonework [L] and the various degenerate styles [M1-M5]. In general, however, direct comparison is possible, and reveals a contemporary development of masonry types, with the province no doubt following the capital.

In defensive techniques, similar parallels exist, but the difference between the metropolitan and provincial walls is more pronounced. The double Theodosian rampart was far more impressive and better defended than the walls of Nicaea, where the curtain had but one defensive zone. The Comneni adapted the walls of the capital to trebuchet and crossbow two centuries before their successors made corresponding changes in Nicaea. The outer wall of Vatatzes appears to have been built in direct imitation of the Theodosian, as if to proclaim the strength and importance of the new imperial capital; it is no accident that the walls are singled out for special praise in the encomium which Theodore II delivered before his father Vatatzes, a piece of concrete fact almost unique in the speech. In a final period, both ramparts were modified in similar ways: towers were raised and reinforced, most openings were blocked, apparently to provide superior defence with smaller manpower.

Nicaea and Constantinople present the same kind of problems which make the study of masonry and its chronology extremely complicated. Imitation of earlier styles is equally pronounced in both places, where the original walls made such a strong impression that an almost identical masonry was produced for centuries. Each section, therefore, needs close examination to determine its date. The influence of such masonry made itself felt in a context: repairs to the Theodosian walls, as to the southern wall of Nicaea, were made in the existing style, but where the model was absent, new styles were readily employed, as in the Blachernae or the southwestern walls of Nicaea. Masonry of quite different appearance could thus be built in the same circuit at the same time. A similar phenomenon is especially evident in the Lascarid walls which manifest an abundant variety of styles.

Both walls, after the initial stages, make constant use of spoils, especially reused brick. New brick is rare in later periods, though it does occur in the walls of Michael III and of Lascaris. Use of broken brick and stone was by no means confined to periods of poverty and decay (unless the whole Byzantine age be so regarded), and such material was plainly not considered to detract from the splendor of structures of the most prosperous and successful ages. There seems little danger in these walls of confusing Byzantine and Turkish work, sometimes a problem elsewhere: at Nicaea, the latter seems not to exist, while its quality at the capital is distinctly inferior to the Byzantine.

The masonry of these complex walls needed to be analysed in some detail in order to work out a sequence of types and some criteria for dating them. Although far more remains to be done, these chapters may serve to identify some of the problems and suggest means of resolution. The chapters which follow will discuss a large number of fortifications in considerably less detail to show that similar methods may be applied on a smaller scale to produce results which, if less precise, will still enable the remains to be dated and thus integrated into the historical record.

TABLE II – NICAIA: MASONRY TYPES

TYPE	DESCRIPTION	FIGURES
All brick		
A1	Bricks separated by equal amounts of mortar on all sides; joints = bricks; neat rows; no beam holes; often vertical pointing at ends	3, 8, 26, 38
A2	Bricks in uneven rows; mostly whole, somewhat larger than [A1]; joints = bricks	4, 9
A3	Bricks very close set in straight rows; joint often narrower than brick, but varying; beam holes; often has pointing parallel to bricks	6, 8, 10, 18, 42
A4	Mixed broken and whole bricks well separated; 'soft' appearance; chamfered mortar	11, 16, 54
A5	Wide mortar joints; uneven straight courses	7
A6	Very wide joints, resembles recessed brick	20
Recessed and 'covered' brick		
B1	Real recessed brick; fairly close set, irregular spacing	1a, 15, 21, 22
B2	Not recessed; single courses of brick	24, 41
B3	Not recessed; many brick courses	44
B4	Not recessed; elaborate, with cloisonné	5, 35, 52
Banded masonry		
C1	Widely-spaced bands of 4 bricks amid neat mortared rubble	24
C2	Rebuildings of [C1] in same style, many variations	19, 51
C3	5-7 bricks in bands; few stones; rough	44
C4	5 bricks in bands; many stones; neat	45
C5	5 bricks in bands; large spoils	40
C6	Irregular alternation of spoils and fieldstones with bands of 4 or more bricks	30
C7	Bands of 6 bricks; extra brick courses in rubble	31
C8	Numerous bands and extra courses in irregular pattern	34
C9	Rhythmical alternation of brick and stone	33
C10	Elaborate, with cloisonné	25
C11	Elaborate decorative brickwork	23
Alternating brick		
D1	1 or 2 thick bricks, 1 stone course	32, 37
D2	1-3 bricks, 1 stone; especially superstructures	39, 45
D3	As [D2], with recessed brick	15
D4	Very rough alternation stones and brick; mostly outer wall	18, 33, 53
Cloisonné		
E1	All cloisonné, or extensive sections	1b, 47

All stone

F1	Neat ashlar spoils	27, 28, 29, 36, 39
F2	Smallish long blocks	36
F3	Rough courses	49
(F4)	Omitted	
F5	Base: well-cut stones, little or no mortar	26
F6	Base: neat spoils with wide joints	1c, 42, 46
F7	Base: roughly arranged spoils	4, 10

Miscellaneous late styles

G	Irregular patching with brick and rubble	11
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TABLE III – NICAIA: MORTAR TYPES

The classification which follows is provisional, and has been made solely on visual criteria: the colour of the aggregate and the size and nature of the inclusions.

A	Dark, sandy aggregate of dirty appearance, brown-grey; inclusions abundant, mostly brick, but much stone. Smoother and lighter in the interior than on the surface. Generally coarse.
B	Grey-whitish pink aggregate with much brick sometimes in large fragments; smoother without brick in interior. Usually no stone.
C	In general, light mortars with very large accumulation of inclusions in the following varieties, all extremely coarse: C1 More brick than black pebbles C2 More black pebbles than brick C3 Equal amounts of red brick, black pebbles C4 Mostly composed of inclusions
D	Grey, sandy aggregate, little to no brick
E	Light grey aggregate, often smooth; varying inclusions, mostly pebbles.
F	Light grey aggregate with tiny black pebbles, no brick. Resembles pepper.
G	White aggregate, with more pebbles than brick; often no brick.
H	Smooth grey – pinkish aggregate, often without inclusions.
J	Miscellaneous

TABLE IV – NICAIA: MASONRY TYPES

CHRONOLOGY AND OCCURRENCES

TYPE	DATE	RECORDED EXAMPLES (single numbers refer to towers, double to sections of wall)
All brick		
A1	260/269	Yenişehir Gate. 8. 16. 18. 25. 37. 38. 44. 48. 50. 68. 74. 76. 84. 90. 92. 93. 108.

A2	858	1. 5. 17. 20. 32. 41. 44. 54. 66. 67. 95. 102. 113.
A3	1208/1222	7. 9. 16. 18. 19. 20. 25. 26. 68. 89. 93. 96. 102. 106.
A4	1222/1254	20. 23. 24.
A5	Lascarid	15. 113.
A6	Lascarid	27. 29.

Recessed and 'covered' brick

B1	1065; c.1100; Lascarid	19/20. 22. 33. 35. 37. 38. 47. 54. 58. 106B.
B2	XIIc — Lascarid	36/38. 41/42. 46. 94/96. 97/98. 99/100.
B3	Lascarid	96/97. 98/99.
B4	XII/XIII c.	10/11. 88/89. 110/112.

Banded masonry

C1	260/269	18/19. 45/46. 66/67. 73/74. 89/91. 100/102. 112/113. <i>et passim</i> .
C2	VIII-XIII c.	20/24. 25/26. 27/28. 54/55. 108/110. 112/113.
C3	858	97. 98. 99. 100. 100/101.
C4	858	97/100.
C5	Lascarid	94/95 inner face.
C6	XII c?	76.
C7	XII c.	78/80. 87/88.
C8	Late XIII c.	88.
C9	c.1290	84.
C10	XIII c.	50. 58.
C11	Lascarid	43 bastion.

Alternating brick

D1	XII c.	83. 89/90.
D2	1222/1254	28. 89. 93. 95.
D3	Lascarid	22.
D4	1222/1254, XIV c.	18. 22. 25. 27. 28. 48. 84. 97. 108.

Cloisonné

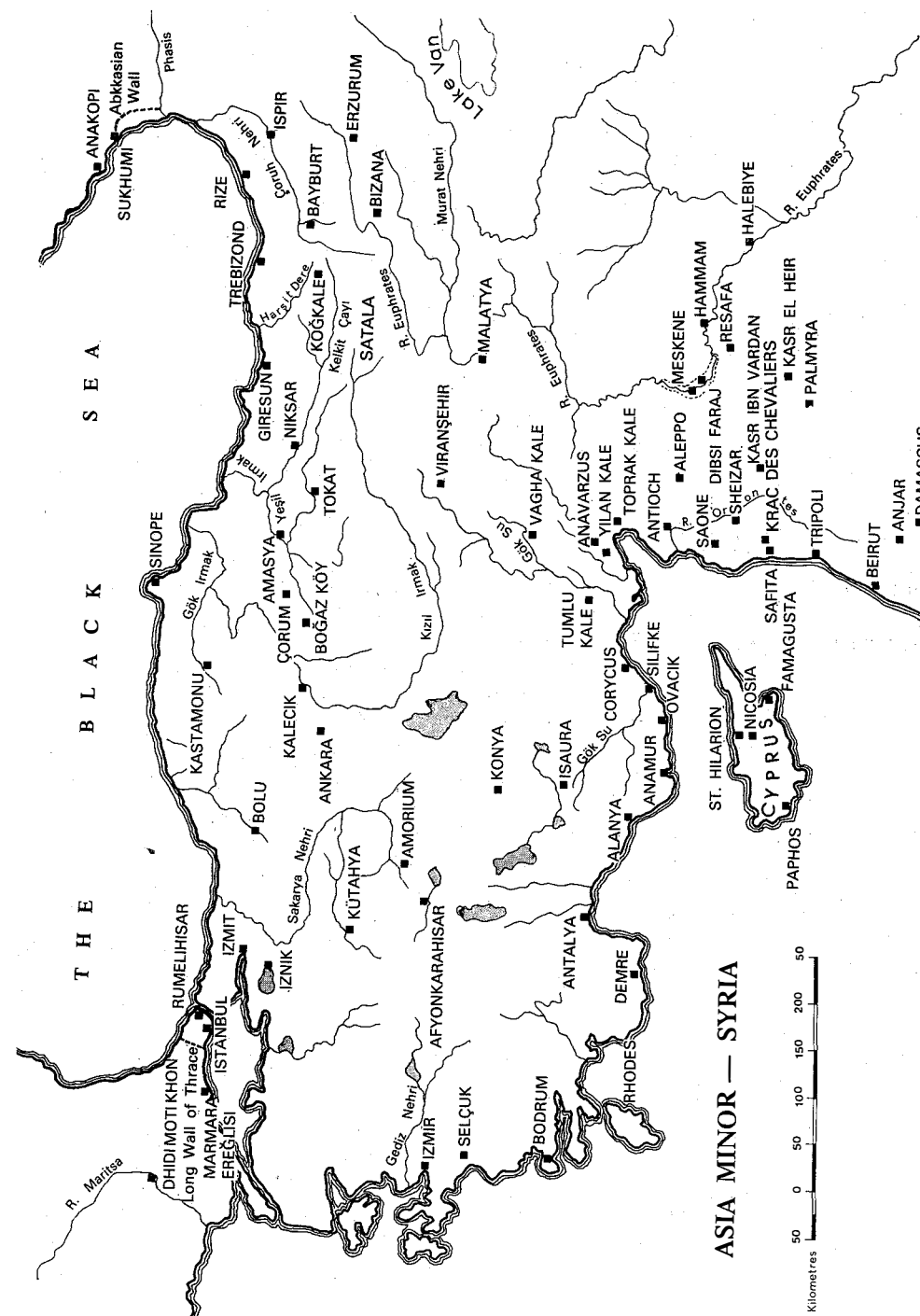
E1	1222/1254	47. Outer wall, Istanbul Gate.
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All stone

F1	c.730	70. 71. 72. 89/Lake. 94. 94/96. 99/100.
F2	XII/XIII c?	89/Lake.
F3	c.1100	106B.
F5	Mostly III c.	46. 47. 48. 50. 54/55. 64/65. 67.
F6	Various	1. 3. 5. 18/19. 20. 54. 66. 96.
F7	Various	7. 9. 13. 15. 17. 19. 19/20. 27. 34. 36. 37. 64. 65. 83. 94/95. 95. 102.

Miscellaneous

G	XIV c?	19/20.
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Fortifications of Asia Minor

Technique, Style and Development

Among the numerous Byzantine fortifications which survive in Asia Minor, few are as well known as the walls of Constantinople or Nicaea, or are of a size and complexity to lend themselves to an analysis in such detail. Many, however, have been studied, and often sufficiently to establish a chronology. These fortifications, of all periods from the third century through the thirteenth, provide the essential material for studying defensive techniques and styles of construction, and thus offer a basis of comparison for the analysis of other, undated, monuments (fig. 1). The dated fortifications, and a small selection of the undated, will be considered in chronological order in order to determine the characteristics of defense in each of the major periods of construction.¹

THE THIRD CENTURY

Asia Minor, the heartland of the Byzantine empire and the home of the fortifications to be studied here, knew a long period of uninterrupted peace and prosperity under the Romans from the time of Augustus until the middle of the third century. A foreign invader first ravaged the country during the crisis of the Empire amid the many calamities which afflicted the reigns of Valerian and Gallienus (253–268). On several occasions, raids of the Goths and allied tribes struck deep into Anatolia, capturing and plundering the rich cities of Pontus, Bithynia and Ionia, and striking as well the interior regions of Galatia and Cappadocia.² In many cases, the cities were captured because their defences were not in good order or, perhaps most frequently, because they were not walled at all, for it was rare that a city far from the frontier would have been fortified during the secure days of the *pax romana*. The attacks of the Goths, and the age

of crisis in general, provoked a fundamental change in the appearance of the ancient city by obliging many of them to surround themselves with walls. From the middle of the third century until relatively modern times, city walls and fortifications became a prominent feature of the landscape of Anatolia and other regions which had been included within the Roman empire. The walls of Rome itself, begun by Aurelian in 271 are the most impressive example of the imperial response to the crisis; in the region here considered, the fortifications of Nicaea are the greatest of the age. There are in addition other sets of walls datable to the period of the invasions which may be studied to understand a reaction which was perhaps more common and which produced a far less elaborate system of fortification.

For MILETUS, the Goths were not merely a threat, but a reality. When the neighbouring temple of Didyma was attacked, the defenders, protected by a wall which blocked the entrances to the still unfinished building, were only saved by the intervention of Apollo, who miraculously caused a spring of fresh water to appear.³ In the city, the reaction was rapid, and a new wall was built to protect it in the reign of Gallienus.⁴ This wall, which has been published in some detail, followed the line of an ancient ruined circuit to enclose the whole central and southern parts of the city (fig. 2). Most of it was built on a foundation of column drums, and had a facing of spoils over a core of mortared rubble. The facing in the particularly fine section on the west consists of regularly arranged blocks closely fitted together. Behind them, other blocks laid at right angles provided a reinforcement which reached through the core, and at the same time served to bind the mortared rubble together. The outer face was executed with far more care than the inner, which is usually irregular and sometimes consists merely of brickwork. Otherwise, brick is usually absent. The facing of the southern wall is less regular, and the inner reinforcement is lacking, but the principle of using spoils as a facing for a rubble core is followed. The spoils consists largely of material taken from grave monuments rather than buildings, which the wall is careful to spare. The city was evidently not in ruins, and the builders expected the return of better days.

This so-called Gothic Wall is a relatively simple structure, usually about three metres, though sometimes only 1.5m, thick; it stood some four to five metres high. Although it followed an ancient wall, it had almost no towers, relying instead on the indented trace of a Hellenistic wall. Two small towers in front of the Theatre may belong to this wall, as does the rebuilding on a smaller scale of one of the towers of the main southern gate, which thus became a far simpler structure than it had been. Other entrances consist of simple posterns, unprotected by towers.

Unlike most such monuments, this wall may be dated quite precisely. Coins of Gallienus were found within the mortared rubble of the core and leave no doubt that the fortification was indeed built against the Goths. Its nature suggests that they were an unsophisticated enemy against whom a relatively unsophisticated bulwark would suffice.⁵

Among the several fortifications on the acropolis of PERGAMUM, one, which surrounds most of the hill, has been assigned to the time of the Gothic attacks.⁶ It encloses all but the topmost part of the hill, which would have been protected by the massive substructions of Roman buildings, earlier walls, and natural features. For much of its course, especially on the western side, it follows the line of the earliest, so-called 'Attalid' wall, which had already been replaced in the Hellenistic period, and is built directly over its ruins. On the southern side, it takes advantage of the terrace of the temple of Demeter and the Gymnasium, but in no case overrides or destroys Hellenistic or Roman buildings.

The wall consists of a core of mortared rubble with a facing of spoils. On the southwest, numerous column drums were inserted near the base, and its southern face is buttressed by masonry

pilasters, apparently in imitation of the adjacent terracing wall. Brick hardly appears in core or facing, any more than marble, for the spoils used are of the local trachyte, indicating that the builders were careful not to destroy monumental structures. Many of the spoils of the facing are taken from older ruined walls, and could be thus be arranged with some approximation to ashlar. In some places, the arrangement is quite distinctive, with alternating courses of large rectangular and thinner flat stones, and with a frequent play of headers and stretchers (fig. 3). The headers extend into the wall to act as a bonding between facing and core. Interstices are filled with mortar and small broken stones, with occasional rows of flat stones — often marble, its only occurrence in these walls — serving as a levelling course. In other parts, the facing is less regular, but it always employs rectangular blocks of trachyte.

This wall, unlike those which preceded and followed it on the acropolis hill, had no towers, but seems to have taken advantage of the many turns in the irregular course of earlier walls to produce on occasion the semblance of an indented trace. Its dating is circumstantial. Its relation to Roman buildings shows that it is later than the second century, while the care which it took to spare those buildings, along with the absence of marble, suggest a relatively early period when the return of order and the restoration of the classical city might still have been expected. After the triumph of Christianity, temples would have been disused and available to serve as building blocks, but none of their marble is present in this wall. The third century, as long ago suggested, thus seems the most probable date.

The city wall of SARDIS, which includes most of the area of the ancient city, has been dated by convergent evidence to the late third century.⁷ That it is later than the mid-second is shown by finds of coins and pottery. Since it includes the monumental centre and leaves little outside its circuit, it is a product of Late Antiquity rather than of the Middle Ages, when this central area was largely ruined and deserted. On the other hand it does not protect the basilical church of the mid-fourth century, and the somewhat later adjacent villa, which lie just beyond its circuit to the west. History records no more suitable circumstances for the construction of such a wall, which appears to have been built in some haste, than the time of the Gothic attacks; Late Antiquity was in general a peaceful and prosperous period at Sardis.⁸

The wall stretches some 4 100 metres from the slopes of the acropolis in a highly irregular trace which at one point incorporates the massive wall of the Roman gymnasium into its circuit. It displays considerable peculiarities: no trace of a parapet or wall-walk has been found; there are very few towers; the wall is thin, on the average somewhat less than two metres; it makes frequent turns, apparently from the needs of topography rather than of defence; and for much of its course it was filled behind with a mass of earth so that it almost came to resemble a platform faced with masonry. The three towers on the most exposed northern side are bonded and about seven metres in width; two are semicircular and one square. A fourth tower on the southeast appears to be a later addition. The only gate which has been discovered, at a point where a colonnaded street later passed through the wall, is not protected by towers but merely opens at a point where the wall makes a right-angle turn; it had only the cover of a slightly-projecting bastion. It may, however, be a secondary feature of a time of peace when new works of fortification were not deemed necessary.⁹ Similarly, the bridge across the Pactolus stream was protected by guard rooms rather than towers, but its use of large spoils suggests that it, too, may be later.

The lack of wall-walk or parapet may indicate that a superstructure in wood or brick has disappeared. For much of its length, however, the top of the wall would have been accessible from the earth piled behind, and a very simple form of defence may have existed. The apparent lack of sophistication has seemed to indicate that the walls were built in haste: 2000 men, a number equivalent to the force which would have been required to man them, could have built them

in eleven weeks. The walls may therefore perhaps be seen as the kind of immediate response to the Goths which a large city might make in the hopes of warding off an enemy who was not well equipped for siege warfare.

The wall of Sardis consists of a core of mortared rubble with a facing of fieldstones only somewhat more systematic than the interior. The facing contains courses of large stones followed by one or two of smaller ones and finally by levelling courses of small flat stones (fig. 4). Almost no brick or spoils are used. In its original state, however, the wall would have had a far different appearance since it was apparently covered with a coating of grey plaster divided by pointing into rectangles in imitation of ashlar masonry. This would perhaps have made it a more acceptable part of the visual environment of the monumental city centre; in practical terms, it provided a shelter coat for the rubble wall and its lime mortar. The wall contains frequent square beamholes in regular horizontal rows. These have been interpreted as putlog holes for the scaffolding used in construction, but, since many run through the wall, it seems probable that they contained beams to anchor the facing to the core. Such a use of beams appears to be uncharacteristic of the time; it may be explained at Sardis as a cheaper and quicker equivalent of the brick bands which performed this function at Constantinople and Nicaea.

The walls of Sardis, apparently a simple but efficient response to an immediate threat, have a direct parallel in those of PHILADELPHIA, the neighbouring city to the east.¹⁰ These are in a masonry technique related to that of Sardis, and display some of the same peculiarities: the circuit is irregular, with frequent turns; the wall is only about two metres thick; the few towers are square or semicircular; and there is no trace of a parapet. On the other hand, the gates of Philadelphia are more sophisticated, protected by flanking towers; there are more towers than at Sardis, some separated by about 75 metres; and traces of an outer wall have been noted. In addition, some remains of stairways which evidently led to the top of the wall have been found near the northeast gate. These differences cannot be evaluated without a satisfactory survey, for the walls of Philadelphia seem to have been in constant use for a millenium until the final capture of the city in 1390, while those of Sardis had no function after 616. Variation of technique or detail between them, therefore, could be the result of later rebuildings. In any case, the virtual identity of masonry suggests that both belong to the same period of crisis.

The walls of the late third century have many characteristics in common. Most notable, perhaps, is their plan: the four dated examples all show a complicated indented trace with few if any towers or provision for installing defensive artillery. In this, they differ from the fortifications of subsequent periods. Their circuits are generally long enough to include the greater part of the ancient city centre, and they show great care not to damage classical buildings. Where they are built with spoils, they use material from graveyards or old dismantled walls. They were evidently intended as parts of an ancient city and do not represent any fundamental transformation of its size or nature. Towers, if they exist at all, may be both semi-circular and square in the same circuit. Gates tend to be simple structures unprotected by towers.

These walls are all relatively thin, with cross-sections of 1m50 to three metres, and are built with a facing over a core of mortared rubble. At Miletus and Pergamum, the facing is of spoils, sometimes arranged in alternating broad and narrow courses. Pergamum also uses levelling courses of small flat stones, a feature noticeable at Sardis where, as at Philadelphia, the facing is of fieldstones. The facing of Sardis, however, was disguised by a coating of decorative plaster. Facing and core were bonded in various ways: at Miletus by reinforcing blocks laid perpendicular within the wall; at Pergamum by a system of headers and stretchers; and at Sardis, uncharacteristically for such an early period, by wooden beams.

Such similarities unite this group of contemporary walls. In almost every respect, however, they

differ from the walls of Nicaea, which were built at the same time under the same circumstances. Nothing here corresponds with the straight curtains, massive round brick towers or elaborate gateways of Nicaea, nor with the brick bands which run through and strengthen that wall. Only the use of fieldstones in the facing finds a counterpart in this group. It is evident that walls of radically differing appearance and nature were being built at the same time, and that those of Nicaea are far from being typical. Their superiority to the rest would certainly have justified their proud appearance on the coins of the city. The explanation of these differences may lie in the origins of the fortifications. Those of Nicaea were built by the imperial government, the rest probably by local and less well endowed authorities. There would thus appear to have been a formal and elaborate imperial style of wall, and a far simpler local type of fortification. Both, however, have characteristics which may be considered typical of the age of crisis.¹¹

THE TETRARCHY

The age of Diocletian (284–305) was a period of active construction, the first in a half century. Some of it was on a massive scale and involved the rebuilding of entire cities, especially the new imperial capitals. Of these, NICOMEDIA, the seat of the senior emperor, was intended to equal Rome. Diocletian provided it with palaces, colonnaded streets, a mint, an arms factory, and other structures appropriate to the capital of an empire and a century later it was still one of the largest cities of the Roman world.¹² When the Goths attacked Bithynia in 258, they moved on Nicomedia, a city then famous for its wealth. Although the inhabitants had fled with their valuables, the barbarians were still astonished by what was left behind.¹³ This narrative implies that the city had at that time no fortifications, or at least none in servicable condition. Diocletian remedied the situation by erecting a rampart more than six kilometres long which ran along the crest of the hills above the harbour to enclose a substantial area.¹⁴

Much of the upper part of this wall has survived and shows a remarkably consistent style of construction. It is built with a facing of fieldstones arranged in rough but fairly regular courses, the flat sides on the exterior. Bands of four bricks running through the wall interrupt this at regular intervals (fig. 5). The bricks are about 30 centimetres square and three thick and bear a rough diagonal raking. The inner core, barely differentiated from the surface, is of smaller stones set in a good deal of light mortar which contains brick fragments and pebbles. The facing stones are usually larger and have evidently been selected for that position. In some places, the wall appears to have a base of spoils, now obscured by undergrowth. It contains one massive tower at the high point on the northeast, and had other round and square towers at intervals of 20–50 metres. The surviving section contains no obvious traces of rebuilding, for these walls appear to have been replaced in the Dark Ages by a far smaller citadel on a steep hilltop within their circuit.

In all particulars, the upper wall of Nicomedia bears a close resemblance to the third-century walls of Nicaea. Both use rubble with brick bands running through; both have bricks of the same size and markings. Apparent differences seem attributable to the better preservation of the walls of Nicaea. The comparisons suggest that the style established for a fortification of imperial foundation in 268 was considered suitable for the walls of a capital some thirty years later. The historical sources alone enable the short space of time which separated them to be perceived.

LATE ANTIQUITY

The long period from Diocletian to the beginning of the seventh century was one of almost uninterrupted peace and prosperity for the cities of Asia Minor. Although the European provinces

had frequent occasion to fear or suffer enemy attack, those of the east, if well behind the frontiers, had little occasion to build or even repair fortifications. Only the regions neighbouring the Taurus mountains whence the turbulent Isaurian tribes descended were more exposed and had to take measures for their defence, but for the most part they fall outside the scope of this survey. In the area here studied, few surviving walls may be dated wholly or partly to Late Antiquity.¹⁵ It will therefore be necessary to turn to Thrace, the site of the greatest of all fortifications, those of Constantinople, and of one other rampart of interest.

In Asia Minor, the proconsul Anatolius built walls for SMYRNA in the time of Arcadius and named them for the Emperor. The few traces of them now visible show an undistinguished facing of spoils, some of it the result of late repairs. In the eighteenth century, however, they were still standing when the Dutch traveller van Egmont saw them. He reported that they were some twelve miles in circuit and consisted in part of marble intermixed with brick, thus closely resembling the walls of Constantinople.¹⁶ It seems probable that the walls so described were those of Arcadius, but no further details are known.¹⁷

A rampart far different in purpose from any other here discussed stretched for almost 45 kilometres across the Thracian peninsula some 65 kilometres west of Constantinople. These LONG WALLS OF THRACE were designed not only to protect the approaches to the capital, and to stop an enemy at a distance, but also to safeguard its water supply. Their length and defensive aims make them more comparable with a barrier like Hadrian's Wall in England than with contemporary fortifications in Asia Minor. Although there is some dispute about their date, it seems clear that they were built or rebuilt by Anastasius in 512. Substantial remains of the northern part still stand, and have been the subject of several short studies.¹⁸

The wall is consistently built with a core of mortared rubble and a facing of well cut square to rectangular limestone blocks. The rubble core, bound with a hard pink mortar, is about two metres thick, the blocks of the facing about 60 cm, so that the thickness of the wall varies from about 2.5m to 3.75m. The stones of the facing, cut to fit precisely with very narrow joints, form a fine ashlar which is varied in some places by a mixture of larger and smaller blocks. Brick does not appear in facing or core. The superstructure does not survive in the parts which have been surveyed, but a series of blind arches built against the inner side of the wall in a section where it is only 1m75 to 2m thick were plainly intended to support a wallwalk. External defenses consisted of rectangular and pentagonal towers about 150 metres apart in the northern section and semicircular towers with separations of about 45 metres in the south. A ditch of about 10 metres wide and three deep lay before the wall. Gates appear to have been simple openings leading to and through rectangular forts protected by corner towers of which one stood on the inside of the circuit.

In the context of such walls, the fortifications of the capital are as overwhelming as the city itself must have seemed to the neighbouring provinces. Nothing compares with their double rampart, their massive towers of varied shapes, or with their elaborate system of defence. In size alone, they are far greater than any other fortification. Since the government which built them had the resources of the whole empire at its disposal and since the city which they protected was far larger than any other, it is not surprising that they have no equal. In some respects, however, in spite of the difference of scale, these three late antique walls have elements in common. Constantinople and Smyrna, erected within a few years of each other, both employed marble and brick bands. Whether this was typical of the time or was an expensive method of construction which suited an imperial foundation cannot be determined without more comparative material. There are further similarities between the Long Walls and the Theodosian walls of the capital, separated by a century. Both have a ditch, towers of varying shapes,

and a fine ashlar masonry. If the Long Walls used brick bands, they would look very much like those of Constantinople. Only the forts directly behind the line of the wall are a feature not found elsewhere, and one to be explained by the different function of the Anastasian rampart. If these three examples will support generalisation, it would appear that wall builders of the fifth and early sixth centuries favoured ashlar masonry, with or without brick bands, and towers of different shapes in the same wall.

THE DARK AGES

The peaceful prosperity of Asia Minor came to a sudden and brutal end in the early years of the seventh century. During the course of a long and destructive war between Romans and Persians, the country was overrun and completely devastated. So severe was the disruption that many cities were ruined forever and a whole way of life based on them came to an end.¹⁹ The Persians were soon followed by the Arabs whose incessant raids tormented the land for two centuries. Anatolia never had a chance to recover, urban life was virtually at an end, and fortification became the greatest necessity of the day. These centuries of the Dark Ages, therefore, were one of the great periods for the construction of defences of all kinds in all places. Although many may be identified, few have been dated, for sources are poor and inscriptions practically non-existent. Yet the few cases where information is available include some especially important fortresses, most of them the defences of the drastically reduced medieval city, which usually occupied a fraction of its ancient site. Four of them may be attributed to the first great period of reconstruction, the reign of Constans II (641–668), when the Empire apparently began a fundamental reorganisation of its military and political life, a reflection of the radically changed social and economic conditions. In addition, some of the rebuildings of Constantinople and Nicaea date from these obscure centuries and may be used for comparison.

The fortifications of the steep acropolis of SARDIS, which towers some 300 metres over the adjoining city site, have been dated to the middle of the seventh century by convergent evidence. They are necessarily later than the time of Justinian since an inscription of his reign is built into their circuit; the vast number of spoils they contain shows that they must have been built at a time when much of the city was in ruins. After Sardis was devastated and destroyed by the Persians in 616, most of the city was abandoned. No signs of activity in the lower city have been discovered between the destruction and the reign of Constans II, when the main road up the Hermus valley was rebuilt over the ruins of ancient shops and colonnades in the former city centre. Coin finds suggest that the fortress was part of the same project of reconstruction.²⁰

Erosion of the soft conglomerate of the acropolis has carried away most of the walls which would have surrounded the hill. A substantial structure on the south, however, remains, together with an isolated tower on the west. The walls are consistently built with a facing of spoils and a core of mortared rubble. The densely packed material of the core contains numerous large stones and architectural fragments. Most striking is the facing, made up of the debris of the ancient city (fig. 6). It consists almost entirely of marble blocks representing a vast variety of ancient buildings. Statue bases, architraves, column drums and capitals, and every kind of spoil, many of them bearing inscriptions, attest to the complete delapidation of the city. The material is arranged as regularly as possible in straight courses. Since much of it was broken, probably in transit up the steep hill, there are many gaps, filled with broken brick, small fieldstones and flat stones, all set in a coarse pinkish mortar with many brick fragments. This in turn has frequently been covered with a shelter coat of grey mortar.

The decorative arrangement of architectural fragments, which makes the walls seem to be made of marble, is their most distinctive feature. They are about three metres thick and stand some

ten metres high. On the south they preserve a feature rarely to be found elsewhere, a long covered gallery with large arched embrasures facing the slopes toward Mount Tmolus. This contains a mixture of new and reused brick and is shown by identity of mortar to belong to the original construction. The walls as preserved have no real towers — only a solid bastion to the right of the gate gives the impression of one — but prefer solid triangular projections which on the south side serve both as sites for the embrasures and as buttressing. The walls seem to have been simple, even hasty, in their construction, with their foundations laid directly on the conglomerate which had been covered with a layer of grey mortar. The work was consistent throughout; its preservation in such a precarious location shows that it was in fact executed with considerable skill.

The most imposing part of the medieval fortifications of EPHEsus consists of a gate below the cathedral church of St. John, the so-called Gate of Persecutions, and its two massive flanking towers. These formed the main entrance to the fortress which surrounded the hill on which the church was built; most of it has succumbed to later rebuildings. The gate and towers are of two periods: an earlier represented by the two square towers and an inner gateway joined to them by flanking side walls, as well as the surviving lower parts of the outer gateway between the towers; and a later, which comprises the present entrance structure and the ruined outer shell which once transformed the towers from square to pentagonal.²¹ In both periods, the entrance gate was double, forcing an enemy who succeeded in penetrating the outer defences to pass between two high walls, exposed to their fire before reaching the inner gate.

The original towers have a core of mortared rubble covered with a facing of marble spoils, regularly coursed and closely fitted together. The spoils, largely from the Stadium and the nearby Temple of Artemis, include a row of column drums on the east tower (fig. 7). Gaps between the marble are filled with small stones; brick rarely appears. These towers were defended from chambers at the level of the top of the entrance arch; they had two splayed loopholes facing outward and apparently one on the side away from the entrance. The chambers were vaulted in brick, virtually the only occasion when this was used, and supported an upper platform, now lost.

The changes of the second period were executed in a remarkably similar style, with well coursed marble spoils. These produced a more decorative effect above the gate by the reuse of a Roman frieze which early travellers misinterpreted as a representation of the great persecutions. Most of the rebuilding of the towers, which thickened their walls and added a solid triangular point to make them pentagonal, has fallen away to leave the original square structures exposed. The lower surviving courses of the triangular addition show that it was in a similar masonry of spoils.

The dating of this gate depends on the spoils, the historical circumstances and the coin finds.²² Since the early stage includes stones taken from the Stadium and no doubt other public buildings, it should date from a time when parts of the city were in ruins. Ephesus seems to have suffered from the Persian invasions, and from the Arabs who followed them. A large group of coins of Constans II is perhaps to be associated with construction of these fortifications. It is likely, therefore, that the square towers are of the mid-seventh century. The rebuilding would be somewhat later, perhaps of the time of Leo III (717–741) when the district became a separate province with Ephesus apparently as its capital.²³

Another fortification, the city wall, at Ephesus, is to be associated with one of these periods and has been dated to the seventh or eighth century.²⁴ It runs between the hill of Panayir and the harbour to enclose about half the area of the ancient city. It follows an irregular course

which incorporates the outer walls of existing buildings of some size, the Stadium, the Baths of Vedius, the Church of St. Mary and the Theatre, but runs directly over lesser structures such as the shops adjacent to the boulevard of Arcadius in the former city centre. Because of its disregard of the late antique city plan and buildings and since it leaves some of the most important structures of that period outside its circuit, it is certainly to be dated to a time after the severe destruction which took place around 614. This wall, which remains to be properly studied, consists of the usual core and shell, with a facing of reused marble blocks mixed with architectural fragments and large fieldstones; in many places, particularly on the hill, it uses blocks taken from the Hellenistic walls. In general, its work is far less regular than that of the Gate of Persecutions. The core is of an exceptionally hard mortar which contains rubble mixed with fragments of architecture.

This wall displays some notable peculiarities. Its main entrance, by the ancient Agora, is double, consisting of a projecting outer gate protected by a tower joined to the inner gate, which is in the line of the wall, by a long passage between two high banks of debris reinforced with masonry. The wall has virtually no towers, but follows a highly complex trace with many sharp turns. Since its superstructure is missing, its defensive zones are unknown. The style and historical circumstances suggest a date early in the Dark Ages, when the reduced city needed protection against the Arabs. Since the peculiar double gateway seems analogous to that of the first period of the citadel, it is perhaps also to be attributed to the mid-seventh century.

The topmost part of the acropolis of PERGAMUM was surrounded by a wall which on one side, the north, extended beyond the rampart of the third century, but on the other stopped far short of the lower slopes to take advantages of the substructures of the classical Agora. Running east from there, it incorporated only the monumental centre, the most easily defensible part of the site, to represent a drastic reduction of the city. Unlike the wall of the third century, this made systematic and ruthless use of earlier buildings. Since its southern course incorporated much of the altar of Zeus, it had to be demolished by the excavators. It is plainly the product of days which saw Pergamum in ruins; exceptionally abundant finds of coins of Constans II have suggested that the wall is of his reign.²⁵

This wall has a core of rubble mixed with many architectural fragments in a very hard mortar. It is faced consistently with spoils arranged in neat courses, the gaps filled with brick fragments, small stones, and a greyish mortar with many inclusions. The spoils were laid with great care and even in some places were clamped together, a practice apparently without parallel in this period. On the northeast corner, the facing is made up of the ruined temple of Faustina which was apparently still standing, for the lower parts of the wall contain the architrave blocks, with long rows of column drums above them, and the pieces of the crepis in the upper part; that is, the temple was demolished and put back in reverse order in the wall (fig. 8). The columns, set perpendicular to the wall, would have served also to bind the facing to the core. The careful and decorative aspect of this wall makes it one of the most striking monuments of the Dark Ages.

Since little is left of these fortifications, their defensive system is poorly known, but the surviving remains as well as plans of the parts which have been removed suggests that it had few, if any towers. Instead, it followed an irregular course and appears to have had projecting solid bastions at the points where it made a right-angle turn. Nothing survives of its superstructure.

Historical considerations have suggested that the inner circuit of walls at ANKARA is also a product of the reign of Constans II.²⁶ These surround an area of about 350 by 150 metres on the top of a large and rocky hill overlooking the site of the ancient city and the surrounding

plain (figs. 9, 10). Like many other cities, Ankara was severely damaged in the Persian wars; in the mid-seventh century it was transformed into a large and powerful fortress of an unparalleled kind.

The fortress forms a rectangle with its long sides facing east and west; it contains 40 towers, almost all pentagonal, and a massive polygonal corner tower on the southeast.²⁷ The main entrance was on the south, with one postern on the west and three on the steeper eastern side. The defensive system which these walls represent is unlike anything yet considered. Since they stood on a steep hill, a ditch would have been impractical to construct, and the slopes presented such an obstacle in themselves that an outer wall was evidently not felt necessary. The walls were about five metres thick and defended by towers placed at exceptionally close intervals, usually about eleven metres, but in some places as little as eight. The towers themselves are almost invariably pentagonal, often with tapering sides. They present the striking image of a row of prows overlooking the ancient and modern city (fig. 11).

The towers formed a mass of solid masonry to a height of about twelve metres. They may have been intended in part to support a bank of earth behind, for the inner ground level appears to have been higher than the outer. Modern construction, however, has impeded investigation of the area immediately behind the walls. Above this masonry, each tower had a long and narrow vaulted chamber with thick walls which opened onto two extremely narrow loopholes. These were reached from a sort of small antechamber built into the tower walls, usually on the oblique faces. The loopholes were plainly intended for defence by archers. The chambers communicated with the interior of the citadel by a vaulted passage, perhaps reaching the ground by staircases. Since the upper part of the towers has been extensively rebuilt, the fully developed defensive system will be treated below in a discussion of the ninth-century defences.

The main gate presented a further peculiarity (fig. 9a). In most Byzantine fortifications, gates are relatively simple and direct openings through the walls, usually protected by flanking towers. At Ankara, there were indeed twin flanking towers projecting further from the wall than the rest, but the entrance was not between them. Instead, it was adjacent to the curtain on the east side of the rectangle which this projecting structure created. A force attacking the gate would be subjected to fire from the walls on their right as well as that of a tower directly behind. If they succeeded in forcing the gate, they would find themselves in a quadrilateral surrounded by walls which offered fire from all sides as they tried to attack the inner gate in the main wall, itself having the additional protection of a portcullis. The system is remarkably sophisticated for the time, and seems to have been effective since later rebuildings never modified its basic plan.

A final distinctive feature of these defences was the great corner tower on the southeast. This stood on one of the two highest points of the hill and overlooked the plain in all directions. It was a polygonal structure enclosing a large oval court of some 15 × 20 metres. Later rebuildings have obscured the defensive system which probably continued that of the walls. Its size, shape and location indicate considerable importance; it seems, however, not to have been a tower keep which could be isolated from the rest of the fortress.

The walls of Ankara are constructed with the usual facing over a core of mortared rubble, here set in a hard lime mortar with brick fragments. The outer masonry consists entirely of spoils, the ruins of the ancient city, arranged carefully and often with a remarkable elegance.²⁸ In many parts of the more decorative west wall, the spoils are well cut and closely fitted with a regular alternation of rows of broad and narrow blocks with occasional headers and stretchers. Elsewhere, the arrangement is less patterned but still extremely neat (fig. 11). Reused fragments

of sculpture, capitals, architraves and inscriptions are inserted throughout, usually in prominent positions where they would be easily visible from the ground. The most striking decorative section stands between the two projecting outer towers of the south gate, where a row of reused altars is inserted in the masonry to run across the width of the wall with other sculptured fragments above and below (fig. 12). Here, as elsewhere, the richest decoration occupies the most visible position. The west wall, which overlooks a precipitous slope away from the city, is put together with far less care and makes extensive use of pierced stones from an aqueduct which was evidently no longer in use. Even on this side, however, the towers are often constructed with a regular alternation of larger and smaller blocks. Although the superstructure presently visible seems to belong to later rebuildings, fragments of the original facing of the southeast corner tower suggest that it consisted of somewhat smaller blocks than the lower parts and was decorated, at least in some places, with bands of four bricks which did not penetrate through the wall.

The fortifications of Sardis, Pergamum and Ankara, with the first period of the gate and apparently all the city wall at Ephesus, may be dated to the reign of Constans II, while the second period at Ephesus is somewhat later, perhaps of Leo III. They all share many characteristics which may be taken to represent the style of fortifications of the Dark Ages. In their masonry, the whole group makes a consistent use of spoils, arranged in regular and usually decorative courses. The outer face in particular was constructed with great care, making skilful use of a vast variety of material abstracted from ruined ancient buildings. The most striking decoration occurs at Ankara, by the gate; the somewhat later Gate of Persecutions at Ephesus may be compared with it. Pergamum and the first stage of the Ephesian gate use rows of column drums, which in the former represent the careful demolition of a temple. At Pergamum alone, the blocks appear to have been clamped together. The walls of Sardis were as distinctive as the others; only the city wall of Ephesus appears to be a less careful or more hasty construction. In all cases, the spoils form a facing over a core of rubble which usually includes many spoils set in a hard mortar.

Most of these walls date from the mid-seventh century and display a kind of masonry which might be considered diagnostic for that period. The example of Nicaea, however, shows that an almost identical style still existed some 70 years later. It is thus not possible on the basis of masonry alone to date a fortress to a precise period within the Dark Ages. The builders from about 650 to 750 seem to have favoured regularly coursed decorative spoils, presumably as long as such material was readily available. For accurate dating, historical circumstances as well as the nature of the structure will have to be taken into account. An entirely new fortification could well belong to the early period of the Arab attacks, the second half of the seventh century, when there was a desperate need for defence of a country which had already been badly damaged. When, on the other hand, the walls represent repairs to existing fortifications which were already of sufficient strength to defend centres of population, they could be of any period which suits the style. Similarly, defensive techniques need to be considered: the seventh century appears to have been a time of experimentation in fortification, and anomalies found in undated sites might point to that period. In the general absence of historical information, however, it will often be possible to attribute fortifications, especially those only preserved in part, to the Dark Ages, the seventh and eighth centuries, without further specification.

In terms of defences, Ephesus, Sardis and Pergamum form a group; Ankara stands apart. Sardis and Pergamum, and the city walls at Ephesus, have few if any towers and often display an indented trace. At Sardis, triangular bastions appear, while Pergamum used rectangular bastions at points where the wall made a sharp turn. The covered gallery with embrasures at Sardis has

no counterpart except perhaps at Ankara. The city wall and Gate of Persecutions at Ephesus share the complex double gateway, recessed and protected by a single tower in the former, projecting and flanked by massive towers in the latter. In that gate, the square towers were later converted to pentagonal. Ankara differs in all these respects. It has many towers, virtually all pentagonal, set very close together. The towers had upper chambers and probably other defensive works now obscured. At Ankara, there was also a great corner tower and an elaborate and sophisticated gateway of a kind totally unexpected among the generally simple Byzantine entrances.

There is material of the same period for comparison at Constantinople and Nicaea. In the capital, Heraclius built walls by the Blachernae, and Leo III and his successors carried out extensive repairs to the land walls. In all cases, the walls of the Dark Ages closely resemble those of Theodosius II which they imitate directly. Although differences in the arrangement of brick and stone bands may be defined, these walls have little in common with provincial fortresses. Only the use of spoils instead of newly-cut limestone is a feature which all share. The Nicene walls of Leo III, on the other hand, are directly related to the present fortresses. Their defensive techniques, which include the higher balustrade of spoils, may have no counterpart, but their masonry of well-coursed spoils is strikingly similar. Yet its fine arrangement is superior to that of most of the others, as if the city always had more skilled builders than the rest.

The fortresses of the Dark Ages thus fall into distinct groups. Constantinople follows a conservative local tradition paying little heed, it seems, to developments subsequent to the fifth century. Aesthetic considerations were evidently of major importance, but perhaps no less than the fact that the walls of Theodosius had done their job well for two centuries and more, and called for little improvement. At Nicaea, where imitation was to play a major role in later periods, the constructions of Leo III were in spoils of exceptionally high quality. The city was one of the most important of the empire, particularly because of its situation near the head of the main highway to the east, and was therefore perhaps thought worthy of special attention.

Among the new fortresses, Ankara stands out by its remarkable defensive system which should have made it far more powerful than the others. Historical circumstances offer a probable explanation. Ankara was built about the time of the reorganisation of the provincial administrative system, when provinces called *themes* were created; they were governed by generals. It was apparently the capital of the *Opsikion*, one of the four original *themes* into which Asia Minor was divided.²⁹ As such, it was the headquarters of a general, of a large and important garrison, and of a cavalry army whose duty was to protect the northern part of the plateau, and the highway to the capital, from the Arabs. The fortress controlled one of the most strategic points in the country, the junction of highways along which Arab attacks and imperial *ripostes* passed. The importance of the place, therefore, may account for the strength of its fortifications which apparently used the latest defensive techniques, some of them, such as the closely-spaced pentagonal towers, probably experimental.

The walls of the provincial cities, once far more important than Ankara, but now drastically reduced in size and population, seem simple by comparison. With the exception of the flanking gate towers of Ephesus and the vaulted passage of Sardis, their defences appear to be far inferior. This, too, no doubt reflects a present reality. In the reduced and militarised empire of the Dark Ages, the ancient centres of population were far less important than the great fortresses on the invasion routes, for on them depended the very survival of the empire. It is likely that they had far smaller resources at their disposition, and had to improvise what defences they could. Ephesus may have been a partial exception, since from the eighth century it, too, may have been the capital of a *theme*.³⁰

In their new fortifications, these cities appear to have used the techniques of the third century, notably walls with a complicated trace and few, if any, towers. In this, they may have been following the model of earlier walls on their sites. The new work, although it involved the demolition of a glorious past, was of high quality, and displays a sensitivity to that past, or at least its appearance, which will not be characteristic of later walls. These walls would have been visually impressive, giving the appearance of being constructed entirely of marble and highly decorated. If these provincial walls have much in common with those of the third century, the differences are profound, and fortifications of the two periods, if well preserved, should not be difficult to distinguish. Their plans were indeed similar, but the principle which guided the builders in laying them out was entirely different: those of the third century were careful to spare the monumental public buildings on which civic life was based, while in the Dark Ages they overrode or incorporated them without hesitation. Similarly, walls of both periods are faced with spoils, but in the third century they were taken from abandoned or unproductive structures such as old walls or cemeteries, while the builders of the seventh ransacked the site for all kinds of material, as often as not taken from the very structures which the earlier age would have regarded as essential parts of the city. In all this, the fortresses reflect the profound transformation of urban life which marked the beginning of the Middle Ages in the Byzantine Empire.

By using the characteristics just analysed as a basis for comparison, it is possible to assign a large number of undated Byzantine fortifications to the Dark Ages. Most of those which will be treated here, a few selected from many examples, are the walls of reduced ancient cities, one is an important fortress, and a few are the long walls of refuge areas, often in remote locations. Others will be treated at length in a different context.³¹

MILETUS underwent drastic change in the Dark Ages when a new wall was built to include only the monumental centre, a vast reduction in the area of the city (fig. 2). As its citadel, it used the blocked and fortified ancient theatre. The latter has been dated to the eighth century, and the longer circuit to the time of Justinian.³² The city wall followed the line of the Hellenistic walls north from the theatre to the harbour, where it used columns taken from the colonnade of the ruined north market for its base, and apparently had a large tower. From there, it incorporated parts of the Baths of Capito and the Roman aqueduct into its course before arriving at the vast open square of the South Market and its monumental triple gate. One of the openings of the gate was blocked, another converted into the entrance to a tower and the central left open for traffic. This was evidently the main entrance to the city from the south, to be approached from the open space of the former market. The wall was built over the sides of the market until it reached the west entrance where there was another tower. West of there, it incorporated the massive Baths of Faustina, where many pierced blocks of stone found inside were apparently used for tethering horses, indicating a totally new function for the building. The wall branched by the harbour next to the Theatre, with one part extending westward over the ruined colonnades of the Stadium, whose height was evidently of great utility, to end in a tower near the shore, while the other headed north to join the Theatre. The two branches were apparently designed to protect the harbour which lay between Theatre and Stadium.³³

The wall appears to have been two to three metres thick, of the usual construction. It was faced throughout in spoils, sometimes laid in such abundance and arrangement that it makes a far better impression than its predecessor of the third century. Even where the work is less neat, the wall still incorporates all kinds of architectural fragments and many inscriptions. The core similarly included broken statues, inscriptions, and fragments of buildings, all set with rubble in mortar. In every respect, this wall represents the destruction and disappearance of the ancient city, whose monuments were mercilessly looted for its construction.

The Theatre had been the most massive building of the city, as well as the highest since it stood on a large hill. Its location and thick walls made it a natural site for a citadel. A wall four metres thick was built between the parodoi, and all entrances were blocked with spoils. The citadel wall, about 3.5m thick, extended above the Theatre in a roughly trapezoidal shape much smaller in area than the Theatre with which it formed a unified fortification. Steps on the inside led to a broad wallwalk, while square and triangular solid bastions reinforced the north and east sides. The southern entrance was flanked by a single square tower which had two loopholes on its outer face and one on each side. A very thin wall of only 70 cm along with a ditch formed a secondary outer defence.³⁴

The features which the wall and citadel share with the fortifications of the Dark Ages leave no doubt that they are contemporary. The solid bastions of the citadel are a feature found at Sardis and Pergamum, while the lone flanking gate tower of the city wall has a parallel in the similar structure at Ephesus. The gate of the city wall at Ephesus also takes the same advantage of an abandoned open market square to provide a clear line of fire at an approaching enemy. The city wall follows the indented trace of an earlier wall, a characteristic already noted for the third century, but here there is no possibility of confusion between that period and the Dark Ages. These walls make extensive and destructive use of the very ancient buildings which the builders of the third century had been careful to spare. When these were built, the city was obviously in ruins and beyond hope of restoration. Public buildings, many of them restored in Late Antiquity, were destroyed, abandoned or put to new uses. Both the line and the masonry make it evident that these were not a product of any period of Antiquity, but of one which had seen a drastic change. The earlier attribution to Justinian was based on an inscription which proclaims the building, or rebuilding, of the market gate by that emperor in 538. Since the gate was incorporated into the fortifications, the inscription was presumed to refer to their construction. There is, of course, no reason to make such an association, nor is it probable in the slightest that the emperor who took such pride in building would have presided over such a massive work of destruction in a city which was far removed from any danger, during the most glorious and successful period of his reign.³⁵ The inscription, on the contrary, should be taken to indicate continuing rebuilding and prosperity. The city wall and citadel, therefore, may be dated to the Dark Ages, perhaps more probably to the late seventh century, when cities largely destroyed in the Persian wars had to protect themselves from the Arabs.³⁶

Miletus appears to differ from other cities in that it has a citadel. Such, however, may also have been the case at EPHEBUS, where the castle on the hill of Saint John has a lower bailey around the church and an inner citadel on the highest point. The citadel has been attributed to the Lascaris, but a date in this period seems equally probable. The wall which divides the citadel from the rest begins on the west at a gate protected by a single projecting rectangular bastion.³⁷ It contains thereafter one triangular and three rectangular solid bastions, and no towers. The masonry of the lower parts consists of large spoils irregularly arranged and often mixed with rubble. Although this use of spoils does not correspond with the habits of the period, the wall has been extensively rebuilt. Its original trace, in any case, seems far more characteristic of the Dark Ages, when such solid bastions were common, than to any later period. It is therefore probable that Ephesus, like Miletus, had a citadel within the fortifications.

Two neighbouring fortified towns in the northeast, though less well studied, also display characteristics of the Dark Ages. PRUSA AD OLYMPUM, the flourishing modern city of Bursa, was a place of moderate importance in classical and early Byzantine times.³⁸ It stood on an oval hill of about 1 000 by 600 metres which had been surrounded by walls since the Hellenistic period. In Roman times, the town stretched down into the adjoining plains; in the

Dark Ages it withdrew to the hilltop. The Byzantine wall was single on the three precipitous sides, but double on the south where a gradual slope offered easier access. Much of the circuit has disappeared and many of the surviving parts are covered with vegetation or houses, but enough remained to enable a detailed plan to be drawn with the aid of a map of the nineteenth century.³⁹ Since the walls were constantly used and rebuilt by Byzantines and Ottomans, and have never been surveyed, it is not possible to consider their various stages of construction. Some elements, however, plainly indicate an origin in the Dark Ages. The whole northern and western sides display the indented trace without towers typical of that period, while the masonry by the east gate gives every indication of belonging to the seventh or eighth century. It employs large spoils set in regular rows, the joints filled with small stones or broken brick. In some places, smaller flat pieces are inserted vertically or in horizontal rows; and an occasional row of column drums appears (fig. 13). The extensive use of regularly coursed spoils taken from a variety of buildings indicates a date in the Dark Ages.⁴⁰ The east gateway, which has now disappeared, was faced with spoils arranged in alternating wide and narrow rows, like those of Ankara, a further parallel which may be taken to confirm the general date.

The Mysian city of APOLLONIA AD RHYNDACUM occupies an exceptionally scenic location 30 kilometres west of Prusa on a promontory which projects into the lake of the same name; its neck is so narrow that the site becomes an island during high water.⁴¹ An outwork blocked another narrow neck about 500 metres before the main fortifications, which formed a rough circle about 350 metres in diameter. The approach to the town was protected by a large square tower; other towers of similar shape stood round the perimeter. The main entrance was a vaulted passage through a long rectangular tower with gates at both ends. The walls display several periods of construction, of which the earliest appears to reflect the style of the Dark Ages. In most parts of the walls, this consists of a facing of regularly coursed large spoils over a core of mortared rubble. The spoils include architectural fragments as well as a long inscription of Hadrian which adorns the outer face of the large tower. In some towers, the square-cut blocks are arranged in alternating wide and narrow courses. In its masonry, the fortress of Apollonia resembles the others of the period.⁴² The few traces of facing which survive on the outwork seem to be of the same style.

A homonymous city, Apollonia in Pisidia, the Byzantine SOZOPOLIS, has walls which have been attributed to Romanus IV (1078–1081) because of a fragmentary inscription which bears his name and the date 1070.⁴³ Since the inscription was not found *in situ*, it is not clear whether Romanus built or repaired the existing walls, which block the only approach to the isolated ridge of the site, and consist of a curtain with two gates and two towers. The main gate comprises two passages, one about twice the size of the other, built into a projecting square tower; both open onto each other within the tower. One of the towers is also of an unusual shape, with one side curved and the other resembling two sides of a pentagon (fig. 14). The wall has a facing of well-coursed large spoils, repaired in many places with smaller stones. Cribwork is evident on the gate and in several parts of the wall.

According to the inscription, some part of the walls should be of Romanus IV, yet the facing of spoils seems more typical of the seventh century, and some of the repairs bear characteristics of the twelfth. Many of the architectural fragments and inscriptions included in the facing were evidently in good condition when they were used. They represent the ruins of an antique city, most probably delapidated since the seventh century, and in any case taken from buildings which would not have been maintained in the Byzantine period. Their state of preservation, therefore, suggests an early date, the Dark Ages. Similarly, the complex gate and the peculiar shape of the tower suggest the seventh century, the time of experiment.⁴⁴ On the other hand,

the cribwork is more typical of the eleventh or twelfth century, and seems not to appear in the Dark Ages. Most probably, therefore, Romanus repaired an existing fortress, by inserting the cribwork and adding some new facing in smaller stones without fundamentally modifying the work of the Dark Ages.

So far, town walls have been discussed; the rest of the fortifications of the Dark Ages to be considered are of a different nature. A powerful fortress with a special function may be treated first, that called METABOLE in the district of MALAGINA, the broad plain which stretches along the Sangarius southwest of the modern town of Geyve, the Byzantine Kabaia. This plain was the first stopping point for the imperial armies on their way east, and the headquarters of the stables essential for supplying the forces. It thus stood astride the main routes from the capital to the frontier, and north and south along the Sangarius. A powerful fortress was needed to protect a place of such strategic importance; the surviving remains give a clear impression of its strength and indicate a date in accordance with its history which begins in the Dark Ages.⁴⁵

The fortress stands on an extremely steep hill overlooking a small valley which is in turn separated from the river by a ridge. The spectacular view from the summit shows that it commanded the whole central valley of the Sangarius, from Kabaia to Leucæ (fig. 25). Access up the bare and rugged slope was blocked by a lower wall which took advantage of rock outcroppings. This side was defended by a massive projecting tower of Comnenian date, which will be discussed below; the others were precipitous. The major surviving fortifications consist of a wall about ten metres high on the south and southwest sides of the hill. It is built with great skill in a careful and decorative style, the equal of any contemporary masonry. The facing is consistently of large squared spoils, including gravestones and column drums, laid in level courses and fitted as closely as possible (fig. 15). The broken brick and red mortar of the joints produce a colourful impression. At the southeast corner is a square tower with a catapult platform, some of it secondary, and at the southwest an entrance passage leading up to the interior, which is at a higher level. The main face of the wall is strengthened by three projecting triangular bastions.

Malagina most resembles Ankara in its masonry and its strength. Both are built in a similar style on a steep hill (here, higher and steeper), and have a mass of earth behind their walls. The triangular bastions and the embasures of the square corner tower find a parallel at Sardis, to confirm assignment to this period. The resemblance between this fortress and Ankara would be appropriate for two of the most important strategic points in Asia Minor; the imperial government presumably had a role in their construction, to account for their superiority to most of the others. The masonry and defences, in any case, suggest a date in the late seventh century.

The remaining fortifications are less sophisticated, of a different nature altogether, and are found over a wide area. In the north, the site known as HALA HISAR stands in the hills far above the plain and city of CLAUDIOPOLIS, the modern Bolu.⁴⁶ Virtually concealed by pine forests, it has a magnificent view over the whole inhabited basin. The walls surround a large oval area, about 600 by 300 metres. Although now in poor condition and heavily overgrown, they appear to have had a facing in roughly squared and coursed fieldstones (fig. 16). The core is of densely packed mortared rubble, sometimes difficult to distinguish from the face. Virtually no brick or spoils appear, with the exception of a section near the northwest entrance where there may have been brick bands. The interior is heavily overgrown; an occasional pit dug by treasure hunters reveals fragments of coarse red cooking wares and little else. Villagers reported, however, that Byzantine gold coins had been found there.

A similar site in Mysia, now merely called ASAR KALE, "Ruins Castle", occupies the broad top of a steep hill high above the town of Hamdibey (fig. 17).⁴⁷ It, too, consists of a ring wall

around a large area. A core of rough mortared fieldstones is covered with a facing of squared blocks, some of them spoils, which are on occasion arranged in broad and narrow courses. Brick is almost completely absent. There are traces of an occasional square tower and a gateway whose entrance passage makes a right-angle turn; it appears to have been protected by one tower. The ground level on the interior is at present several metres higher than that of the exterior, a phenomenon which could be due in part to the presence of ruined buildings. The well arranged masonry, the relatively complex gate with the single tower, and perhaps the difference of ground level may be taken as indications of a date in the Dark Ages.

Further south, on the border between Mysia and Lydia, the site called ASARLIK at Yırca in the Caicus valley opposite the modern town of Soma, stands on a large round isolated hill. It has a clear view up and down the valley, and of the sites of Stratonicea and Chliara on the adjacent hills. A wall of mortared rubble with little or no brick surrounded the hilltop which was some hundred metres in diameter. It now consists of piles of rubble; no facing has survived. Only some sherds of coarse red cooking ware could be found on the interior. Although its appearance cannot be determined, this wall was plainly of the same nature as the others, occupying a relatively large area in a defensible spot adjacent to a rich valley.⁴⁸

Another example stands in a remote location, high in the mountains of southern Ionia, between the Maeander and the Aegean. The site, FINDIKLI KALE, occupies a hilltop a kilometre long and contains extensive fortifications.⁴⁹ Walls protect the south and east sides and divide the interior into three parts; the other sides were too precipitous to need walls. These fortifications have several peculiarities. They generally follow the line of the edge of the hilltop, but some of the south side has an indented trace. Towers are rare and irregularly placed; rectangular projecting bastions occasionally appear; and gates are of unusual plan. The southwest gate has a round tower outside the circuit connected by a flanking wall to a square tower which stands on the inside of the main fortification. On the east, the wall is double and forms a large rectangular court before the gate, which is also protected by a single tower on the inside of the wall. Gates within the circuit are simple openings; one of the interior walls ends in a triangular tower or bastion. The walls are all built in a rough mortared rubble with very little brick. Much pottery, very little of it glazed, was found within. The plan of the walls, which include some of the peculiarities noted in this age of experiment, would seem to indicate a date in the Dark Ages.⁵⁰

The final example, though less well preserved, reveals details of interest because of its location in a dry country, without the underbrush which obscures the interiors of the others. A high isolated hill stands directly above the town of ALTINAŞ, at the edge of a broad and fertile plain in Phrygia. Its relatively smooth pear-shaped top, about 750m long and perhaps 400m at its widest point, is surrounded by a ring wall, now represented by piles of rubble with occasional bits of brick and few spoils. Within, the whole area was covered with buildings, none sufficiently well preserved to be identified, arranged on one main and several cross streets. Coarse red cooking ware constituted the majority of the little pottery found. There was nothing of evidently late antique or Turkish date. It would therefore appear that the site was the successor of the rich villages of the plain, known from the numerous inscriptions and remains which witness a high standard of living under the Romans.⁵¹ The villages apparently continued to prosper through Late Antiquity, but have produced nothing of substance for the Byzantine period. It is likely, therefore, that the present site is of the Dark Ages.

These sites form a group which differs from the city walls and fortresses so far discussed. The large area enclosed by their walls shows that they were centres of population, but the walls for the most part seem to have been poorly built and there is little trace of substantial building in-

side; they hardly give the impression of permanent settlements. The sites depend as much on Nature as on art for their defence, with their walls built along the edges of steep hills with broad tops. Unlike the city walls, they are often in places which seem inconvenient and difficult of access, ranging from the steep hills of Altıntaş and Asarlık to the remote mountain of Fındıklı Kale. With the exception of the latter, they stand on hills which overlook broad plains, the natural centres of population, though in the cases of Asar Kale and Hala Hisar, at a considerable remove. Their walls are sometimes straightforward circuits with a few towers around hilltops, but occasionally show some sophistication of technique, while their masonry, where it can be judged, is usually undistinguished; Asar Kale is a distinct exception. Most of them offer no obvious evidence for dating.

An historical text of the Dark Ages enables the function and general date of such fortresses to be identified. Saint Theodore had his major shrine in the town of Euchaita in the Pontus, and there he is recorded as performing numerous miracles long after his demise. According to one account, the Arabs would attack the region every year and frequently occupy the town, where they would spend the winter. They used this time to loot the neighbourhood before returning to their homes. Once, when the Arabs were driven home early by a drought, the inhabitants returned to find everything in a state of desolation. They despaired of resettling the city and thought of moving elsewhere until the Saint sent a miraculous rain. The text reveals that they had come down from the 'strongholds' when the barbarians left, and in another place notes that they went to these strongholds every year on the approach of the enemy.⁵² The situation described would be most appropriate to the seventh or eighth century, when Arab raids afflicted most of Asia Minor with annual regularity. The strongholds were evidently in the mountains, but not so far away that the inhabitants would be unaware of the movements of the enemy. Such strongholds perfectly suit the sites just described. They are in the hills, but with full view of the cities and plains: they are easy to defend because difficult to reach. The annual raiding parties of the Arabs were more concerned with loot than slaughter, and were evidently content to occupy the rich plains and leave the inhabitants to their strongholds. Such an identification would explain the nature as well as the location of the sites: they are large enough to include a substantial population, yet seem not built for permanence like the city walls and fortresses. They may therefore be considered as refuge sites of the Dark Ages, used in time of war, and sometimes for a season, but not permanently occupied.

By applying the identifiable characteristics of the Dark Ages, it is thus possible to date numerous fortifications to the period (those presented here are only a small sample) and to make them a part of the architectural and historical record of this obscure age. Miletus, Prusa and the two Apollonias show, not surprisingly, that many cities were at that time drastically reduced, or at least obliged to take measures for their defence. Malagina, like Ankara, stresses the importance of the highway system for the preservation of Byzantine rule in Asia Minor, while the five refuge sites give a vivid impression of conditions at the time of the Arab raids, when virtually no area was safe. With the general lack of historical sources, such material assumes considerable importance, and, when more of it has been identified and published, should form a major element in reconstructing the history of the age.

THE NINTH CENTURY

The Arab attacks continued in full force through the eighth century, their impetus somewhat diminished by the transfer of the caliphate from Damascus, near the Byzantine frontier, to Baghdad, far from it, in 750. By the ninth century, Byzantine fortunes gradually began to recover, the volume of attacks diminished, and the Empire could finally move on the offensive.

Yet this period still saw great disaster — the loss of Crete in 828 and the sack of Ankara and Amorium ten years later. Nevertheless, the Byzantines continued to gain ground, and by the middle of the century were in a position to prepare for the general advance which was to push the frontiers far to the east and introduce a long and glorious period, with peace in Asia Minor. Michael III (842–867) laid the groundwork by building or rebuilding fortresses in a successful effort to strengthen imperial control in western and central Anatolia. The ninth century is thus another major period of fortification, part of it to repel the Arabs, and part to provide bases for movement to the east. The accomplishments of both the early and middle years of the century are visible in one site, a great fortress already known from the Dark Ages.

As the major military base of the plateau, and the capital of a theme, ANKARA was the frequent goal of Arab attacks. One of them, at the end of the eighth century, was so destructive that Nicephorus I (802–811) had to rebuild the city. His work consisted of a new rampart along the lower slope of the hill to enclose an area somewhat larger than the original citadel, thus doubling the fortifications and the protected area.⁵³ The new walls, now heavily restored, had few of the peculiarities of the earlier. The curtain was some three metres thick, and had relatively long sections, with 20 to 30 metres between towers. Most of the towers were square, about 10m wide, and projected 8m from the face of the wall. Round towers, resembling those of Nicaea, flanked the two gates. Since the superstructures are missing or restored, the defensive system cannot be considered in detail, but this lower wall, with its large and heavy towers spaced at relatively wide intervals, is obviously of a more traditional form than the upper. The towers and walls are built of spoils arranged in courses less regular or decorative than those of the inner walls. In the south tower of the upper gate, the courses are only roughly parallel, so that their number varies at different points in the facing, a phenomenon visible also in ninth-century walls at Constantinople. Most of the square towers appear to have been built entirely of spoils, but 16, the last surviving on the southeast, has a band of 12 bricks in the upper part. The round towers by the gates were more elaborate. Tower 5, on the south side of the lower gate, has a band of seven bricks in the middle of the rather rough large spoils, and a brick superstructure with massive crenellations blocked in a later raising. The two towers by the upper gate have a similar superstructure, also later blocked; that on the east has in addition a course of column drums at mid-height (fig. 18). In their use of large spoils, sometimes peculiarly arranged, and their superstructures of brick, these walls resemble sections of the land walls of Constantinople, dated to the early ninth century. The upper gate displays a further peculiarity, the result of a reconstruction. A new wall was built between the towers some six meters in front of the original gate. This created a double gate with a rectangular interior court, similar to the gate of the inner wall, except that here the two gates were in line with each other.

Nicephorus appears also to have been responsible for the addition of a new citadel at the north-east corner, the highest point of the circuit.⁵⁴ Most has succumbed to Ottoman rebuilding, but its plan and lower masonry are suitable to the ninth century. The citadel has two large pentagonal towers with inner chambers and relatively thin walls on its south side, of a kind quite different from the solid towers of the inner wall. They are plainly of Byzantine origin, and their facing of large spoils arranged in somewhat careless courses is virtually identical to that of the lower wall. They may therefore be seen as part of the same project, and the citadel as another means of strengthening the rebuilt defences.

The final major rebuilding of the walls was carried out by Michael III, as attested by a series of inscriptions datable to 859.⁵⁵ This extensive reconstruction apparently repaired damage inflicted by the Arabs in 838, when they are supposed to have destroyed the walls.⁵⁶ Inscriptions still *in situ* show that the upper part of the inner wall was completely rebuilt (fig. 19). New

courses of spoils were added, usually less regular than the original since the available pieces were broken rather than square, along with an entire superstructure of brick and squared stones. This normally had three rows of stones alternating with five courses of brick.⁵⁷ The original towers were conserved and raised, but at some points on the east side new bastions were added so that the separation between towers was reduced to as little as four or five metres. The great tower on the southeast was reinforced by a new shell to give it the unwonted thickness of eight metres, and a small projecting square tower was added to it at the point where it was joined by the lower wall (fig. 9a).

The new superstructures contained important additions to the defensive system. Inner chambers were built over the earlier ones, which apparently remained in use though unconnected with the new. These had large square embrasures on both the lateral and slanting sides and were connected to a covered walkway faced in the same stone and brick and containing similar embrasures. Together, they formed an intermediate defensive zone below the crenellated wallwalk which uncharacteristically continued at the same level to the top of the towers. The walls of Ankara, peculiar in many ways, had the final anomaly of towers and walls of the same height, so that the towers projected forward from the walls but not above them. This presumably shows that the steep slope of the hill provided sufficient height for adequate defence. This arrangement continued around the fortress, including the great corner tower, to provide the possibility of massive fire power. It would have been possible to install catapults on top of the towers, ballistas in the upper chambers and connected wallwalks, and archers in the lower chambers and along the upper wallwalk. Since the towers were extremely close, the number of their defensive weapons and intensity of concentrated fire would have been considerable. The rebuilding of Michael III thus probably doubled the defensive capacity of the upper wall, without making any fundamental change to its plan. It seems probable also that the alterations to the lower walls, with the raised superstructures in brick and strengthening of the upper gate, may belong to this project. They are built in a style sufficiently similar to that of the lower wall to suggest no great passage of time before their construction, and that rampart, too, would have been damaged by the Arabs.

Michael III did not confine his activities to Ankara, but rebuilt other walls in what appears to have been a general reinforcement of the empire preparatory to the offensive against the Arabs. The walls of Nicaea were extensively rebuilt the year before those of Ankara, and an inscription of Smyrna shows that similar work was done there in 857; no certain trace of that, however, has survived.⁵⁸

Constantinople and Nicaea offer much material contemporary with the two periods at Ankara. In the former, the Pteron and the whole circuit of the sea walls were rebuilt in the early decades of the century, and Michael III did much at Nicaea. The sea walls follow the well-established tradition of banded masonry and are thus not comparable. The Pteron, however, and many of the repairs to the northern part of the land walls, depart from that tradition and are in many ways comparable with the walls of Nicephorus at Ankara, some twenty years earlier. In both places, towers have high bases of spoils and a superstructure of brick, but in the capital the spoils are well cut and closely fitted, and interrupted by brick bands at regular intervals. Their stone courses, on the other hand, often are laid like those of Ankara, with the width varying according to the size of the spoils and with blocks of different sizes mixed in the same course. The defensive systems cannot be compared because of rebuilding at Ankara.

The walls of the mid-ninth century at Ankara and Nicaea are of a very similar appearance. In both, bands of brick alternate regularly with spoils, and both places had upper chambers and platforms added to their towers. The configuration of Ankara, however, with its towers and

walls of the same height connected by a covered gallery with embrasures, remains highly distinctive. The sudden appearance of brick bands in the provinces, where they were apparently rare or unknown before the ninth century, raises the possibility that this technique, so characteristic of the capital, had some significance, and was perhaps intended as a sign of the imperial origin of these fortresses.⁵⁹

THE AGE OF THE COMNENI

The long period of peace which Asia Minor enjoyed during the two centuries of Macedonian rule was rudely shattered in the middle of the eleventh century by the first raids of the Seljuk Turks, and destroyed forever by the catastrophic battle of Manzikert in 1071. As the former frontier defences collapsed, fortification once again became an urgent necessity and so remained until the end of Byzantine rule. The first fortresses of this period were built as a response to the Turkish raids, the next as bases for the Byzantine reconquest of Asia Minor, and a long series constructed during the twelfth century represents an effort to bring security to a country which was never free from Turkish attack.⁶⁰

The program of fortification of Romanus IV (1068–1071) affected much of the country, but has left few certain traces.⁶¹ In the period between his defeat at Manzikert and the arrival of the First Crusade in 1097, Byzantine domains in Anatolia were reduced to a few toeholds on the coast and an occasional fortress of the interior whose walls enabled it to hold out against the Turkish onslaught. The immediate need of Alexius Comnenus (1081–1118) was to build and maintain bases for operations against the Turks. Some examples of his efforts have survived on the Aegean and Mediterranean coasts, but rarely in sufficient state of preservation to reveal much of the techniques employed. The small fortress at Didyma, tower 106B at Nicaea, and traces at Seleucia and Corycus on the south coast suggest that the castles of Alexius were rapidly built of materials at hand, and rarely indulged in the luxury of a careful or aesthetic masonry. They are usually built of spoils — roughly arranged in alternating broad and narrow courses at Didyma and Nicaea — or coursed small rubble in Cilicia. Brick does not appear.⁶² They may therefore be seen as the products of an age when fortifications needed to be erected as rapidly as possible, and when the resources available for their construction were severely limited.

After Alexius, with the help of the First Crusade, had reestablished Byzantine control of the fertile Aegean region and the south coast, his son, John (1118–1143) consolidated these gains by fortification. He then moved on the offensive in north and south, finally leaving a far stronger Byzantine domain in Anatolia than he had found. Two fortresses still stand as major witnesses of his accomplishments, and others may reasonably be assigned to his time.

LOPADIUM was built in 1130 on the banks of the Rhyndacus, west of Lake Apollonias in the Mysian plain.⁶³ It was one of the most important bases for imperial campaigns against the Turks, and protected the bridge for the highway which connected the Marmora region with the provinces of the Hellespont and Aegean. The walls form a rectangle of about 475 × 150 metres, and have towers of varying shape set about 30 to 40 metres apart. Gates were apparently simple structures, and the plan offers no peculiarities of defensive techniques, but rather reflects the main function as a fortified camp for assembling troops and moving against the enemy. The masonry is generally consistent. The surviving tower has coursed fieldstones and spoils in its facing, with some alternation, but no regular pattern, of small and large stones (fig. 20) Each course of stones is separated by a lacing course of brick, usually single. Brick fragments laid parallel to the courses frequently fill the joints. There is also much vertical brick which rarely forms a regular cloisonné. The walls are similar, except that the stones are more frequently

small and set in a good deal of mortar, and the brick courses are often straighter. In some places, much of the surface has been coated with mortar to produce a covered brick of the kind familiar at Constantinople and Nicaea.⁶⁴ The technique appears here for the first time in a dated context. Small round beamholes occur in tower and walls, usually in or adjacent to the brick courses.

ACHYRAOUS was built about 1140 on a bluff above a branch of the Macestus in central Mysia, south of the modern town of Balıkesir.⁶⁵ The importance of its strategic location on the highway between the Marmora and Aegean regions is evident from its frequent mentions in later history. The surviving parts include two massive round towers with large embrasures intended to cover the road which leads to the main gate, and a stretch of curtain with the gate, itself protected by a sharp turn in the wall rather than a tower. With its largest dimension of no more than 200 metres, the fortress was evidently not intended as a main centre of population. Its towers, relatively large in proportion to the whole structure, would have given it great strength to defend the road by attacking an approaching enemy, while its steep hill would have made it particularly difficult to take by assault.

The walls of Achyraous are built in a striking style (figs. 21, 22). They employ roughly coursed fieldstones of varied size separated by single or triple courses of brick. Many of the stones are laid vertically, to rest on the narrow rather than the broad side. Bricks are regularly inserted between the stones to form a blanket of a complex cloisonné whose squares vary greatly in size. Small round beamholes regularly appear in the lower parts of the squares. Most notable is the purely decorative brick placed between the stones in a variety of patterns to produce a colourful facing indicative of the great care which was bestowed on this imperial foundation. The decoration finds its closest parallels not in other fortifications, but in the elaborate masonry of contemporary churches, especially those of the Peloponnese.

Beside these two dated fortresses, others have been attributed to this reign on stylistic grounds.⁶⁶ These include SULTAN ÇAYIR, on a hill overlooking the bridge which led the highway across the Macestus north of Balıkesir, and PEGADIA built to protect a fertile plain on the Macestus as well as the road which led down from Phrygia. The former was a small fortress, the latter large enough to accommodate a moderate population. Both are in poor condition, but preserve characteristics of the time, with coursed spoils and fieldstones, brick lacing courses, cribwork and some cloisonné, along with occasional brick decoration and stones set on their narrow sides.

A final example which may belong to the reign of John is ANAEA, on a hill overlooking the coast south of Ephesus, protecting the adjacent small plain and the sea lanes of the Aegean.⁶⁷ The walls form an irregular polygon of substantial area, its largest dimension about 130 metres, and contain horseshoe-shaped towers 20 to 30 metres apart. They had inner chambers of varying shape, and seem to have risen little if at all above the wall. The corner tower overlooking the plain, the most vulnerable part of the fortress, was much larger and higher than the rest; it had thick walls and at least two levels of chambers with loopholes. This tower, flanked by two others less than 15 metres away, seems to correspond with the massive corner towers at Ankara and Nicaea. The three closely-set towers guarded the approach to the gate which stood next to a rectangular bastion at a sharp bend in the wall; in this respect, it resembles Achyraous. The masonry uses spoils, some of them from Hellenistic walls, and roughly squared fieldstones in courses separated by single, double or triple courses of brick. Vertical brick provides an abundant but inconsistent cloisonné; facing and core were connected by cribwork. Stylistic considerations have suggested a date in the middle of the twelfth century.⁶⁸

The fortresses of John Comnenus have several elements in common. They are castles rather than city walls, and were built to protect roads, river crossings, and the routes of coastal ship-

ping. They could offer passive defence by resisting attack and blocking the progress of an enemy, or active defence as bases for troops who could move out and strike an approaching or retreating foe. They gained strength by their location on steep hilltops, difficult to approach but providing a highly favourable angle of fire. Their towers were of varying shapes and heights; the tall corner tower at Anaea had loopholes in all directions, while those of Achyraous were pierced by large embrasures. In both places, gates were defended not by flanking towers, but by bends in the wall and large towers which overlooked the approaches. The masonry is distinctive, with much variation. It usually has courses of brick and stone, often spoils, and much or little cloisonné. The brickwork is rarely regularly arranged, but appears in different forms in walls and towers alike. Achyraous stands apart from the rest with its rich and extensive cloisonné and decorative brick, while Lopadium makes use of a covered brick not used elsewhere. All have small round beamholes and cribwork.

After initial struggles with the Turks, much of the reign of Manuel Comnenus (1143–1180) was relatively peaceful, allowing time for consolidation and construction of fortresses which would bring security to the often ravaged land. The most important product of these years was the organisation of the well-fortified province of Neocastra in the Aegean region between 1162 and 1173. In 1176, however, Manuel came into conflict with the Turks and suffered a crushing defeat at Myriokephalon. During the final years of his reign, and in the following decades, the country was again open to attack, and the Turks made important and permanent advances. The reign was thus another major period of fortification, which has left its traces in several regions.

Two of the fortresses of the Neocastra have been identified. The greater consists of new city walls of PERGAMUM, surrounding the ancient acropolis.⁶⁹ Their most conspicuous part, built on the lower slopes of the hill over classical ruins, contains square, round and horseshoe-shaped towers about 30 to 40 metres apart, and some curtain. The towers are faced with coursed spoils and fieldstones with intervening single courses of thick broken brick and occasional cloisonné (fig. 23). The masonry is often irregular, with many large blocks interrupting the coursing, and with rather desultory courses of broken brick which rarely continue far across the face of a tower. The curtain is similar, with small round beamholes and a shelter coat of mortar. The upper walls have rougher courses of spoils and fieldstones and less consistent use of brick in sporadic cloisonné and short courses. In spite of their highly varying style, the walls all appear to belong to the same period and to manifest the common phenomenon of more exposed parts of a fortress being more highly decorated.

The other fortress of the Neocastra, now merely called ASAR, stands in the hills high above the Caicus valley.⁷⁰ It guarded both the road which led from the valley across the mountains to Sardis and a small adjacent plain. It could also have provided a refuge from Turkish attack to the population of the plain, and secured the authority of the government in the area, the functions, according to the contemporary historian Choniates, of the Neocastra. Most of the castle, which surrounded an exceptionally steep hilltop, has been reduced to piles of rubble. One tower, however, has preserved its distinctive facing of regularly coursed stone with extensive decorative brickwork (fig. 24). The bricks form double courses between two or three courses of stone, and often squares of cloisonné. In some places, vertical bricks have been inserted without horizontal counterparts to provide a decorative separation between the stones. Small round beams connected core and facing. The tower, which is square, has a curious round superstructure with a facing, evidently the equivalent of a defensive chamber.

Another fortification of Manuel has only recently been discovered, that of MALAGINA, which the emperor restored in 1145 after a Turkish attack.⁷¹ One part of the fortress, in a style different from the rest, may be identified with this restoration. A large projecting platform with high

arched embrasures on three sides is visible from afar and commands the entire central valley of the Sangarius (fig. 25). It is faced with spoils taken from adjacent Hellenistic walls, and well coursed mortared rubble; there is a band of three bricks at the level of the springing of the arches. Traces of pendentives show that the interior was covered with a domical vault in brick which would have supported an upper platform. The height and unobstructed range of this structure would have made it a formidable threat to an enemy below. Walls on both sides joined it to the rest of the fortress. The northern was of medium-sized rubble interspersed at irregular intervals with courses of small flat stones, and containing two bands of five bricks; on the south wall, the upper band has only three bricks. The brick bands of this relatively small section of masonry are reminiscent of the walls of the Blachernae. If the additional courses of flat stones are taken as the equivalent of levelling courses of the kind normally executed in brick, the resemblance becomes even stronger.

A contemporary fortress has long since been identified, but rarely noticed. HIERON, at the place now called Anadolu Kavak, was one of a pair of castles which protected the approaches to Constantinople from the Black Sea.⁷² It stands in a commanding position overlooking the Bosphorus; its European mate has disappeared. The fortifications are large and powerful, occupying the top and slopes of a high hill in an irregular polygon more than 500 metres long and from 60 to 130 metres wide. With these dimensions, it is equalled only by Lopadium and exceeded by Pergamum among the Comnenian fortifications. It would thus have been suitable for a garrison of considerable size.

The main entrance was from the high point on the east where two ditches provided an obstacle to delay an enemy under the fire of the two massive round towers which flanked the main gate. They contain very tall cruciform chambers entered through high broad arches. These were evidently divided by wooden floors, for their three splayed loopholes are about eight metres above the ground. A brick dome and arches supported the stone floor of an upper chamber whose original appearance has been obscured by later rebuilding. The two towers stood less than seven metres apart on either side of the gate, a straight passage with a portcullis. In the upper part, the east and south sides of the castle were reinforced by a series of arches which could have supported a wide wallwalk. They were not thought necessary on the precipitous north side, but their absence from the rest of the wall is unexplained. Round towers smaller than those of the gate protected the wall at intervals of 80 metres or more; there were none on the north side. On the lowest part, a spur wall connected the castle with the shore.

The close resemblance between Hieron and the walls of the Blachernae establishes a chronology. Both have towers of similar plan, reinforcing arcades, and almost identical masonry. The walls and towers of Hieron are faced with regularly coursed spoils and fieldstones separated by bands of brick. In the main towers most of the stones are all well squared and set in rows of four alternating with seven bricks. In the lower walls, the stones are smaller and less regular, usually grouped in courses of six, with bands of four or five bricks (fig. 26). The only notable difference between this masonry and that of the Blachernae is that the brick bands here run parallel with the ground, sloping at a steep angle, while those of the capital (and at Malagina) are perpendicular to the towers, disregarding the configuration of the terrain. Most notable is the treatment of the interior of the towers, where the stonework is less regular and has extra levelling courses of brick between each row of stones. In this, they are exactly like the southern walls of the Blachernae where both types of masonry, with and without the extra brick, occur in the same structure. In addition, the lower walls have a good deal of vertical as well as horizontal brick, but neither forms courses or cloisonné. These resemblances leave no doubt that Hieron is a work of Manuel Comnenus.

The upper wall of Telmessus in Caria, the Byzantine MACRE, has been assigned to this period by analogy.⁷³ It has pentagonal and square towers which overlook the harbour and the lower, earlier part of the fortress. The land drops off precipitously behind the narrow ridge on which they stand to show that the wall was designed not to protect an enclosed area, but to provide cover and advantage to troops who could thus overshoot and defend the lower bailey. The undistinguished masonry of the square towers, with its roughly coursed rubble and broken brick, could belong to a later period. The two pentagonal towers, however, have a superstructure of regularly coursed spoils and rubble in which each stone is surrounded by cloisonné; there is also some decorative brick in a maeander pattern. Although there is no exact parallel for the abundant and regular cloisonné – far different from the highly varied masonry of Achyraous, for example – analogy with Pergamum, which also has cloisonné with similar thick bricks, has suggested the attribution to Manuel. The wall is clearly Byzantine, and could not belong to the Lascarids since the place was then in the hands of the Turks. It may thus stand as an unusually decorative example of the period.

Finally, a previously unidentified castle of Ionia may also belong to the reign of Manuel. It stands on a hill at the edge of the mountains overlooking the broad plain of the Memaïomenos north of Smyrna, which has given its name to the modern town of Menemen. The site evidently corresponds with the castle and bishopric of ARCHANGELUS (or 'Of the Archangel') which is mentioned in sources from the tenth through the fifteenth century.⁷⁴ Its Byzantine remains include a straight section of the north wall, a tower on the south and fragments of the circuit. The north wall, preserved to a height of about three meters, is faced with regularly squared and coursed blocks set in a good deal of mortar. Much brick has been inserted between the stones, occasionally in a rough cloisonné, but more often in a regular pattern of single vertical bricks (fig. 27). The tower is faced with mixed spoils and rubble of varying sizes in rough courses, with larger blocks used as quoins (fig. 28). The masonry of the rest is usually of roughly coursed rubble.

The distinctive use of vertical brick which does not form a cloisonné has its counterpart in the tower of Asar in the Neocastra; it seems an extremely unusual feature. The rough work of the tower, with its more regular quoins, is similar to that of the upper walls of Pergamum to suggest that here, too, the more visible section – the north wall faces the main approach to the castle – was more highly decorated. Archangelus may have been one of the Neocastra. The exact extent of the theme at the time of its creation by Manuel is uncertain, but by the Lascarid period it appears to have extended as far south as Magnesia to include this area.⁷⁵ If that were the case in the twelfth century, the proposed dating would receive further confirmation.

The fortifications of Manuel display many techniques and styles, but have important elements in common. Their masonry tends to employ an alternation of single brick courses, often inconsistent, with spoils and rubble, and only occasional cloisonné or decoration. There is generally a sharp distinction between more and less visible parts, with the latter executed with far less care. Such a distinction is visible even at Macre, which uses extensive cloisonné, and Hieron, whose finer masonry is to be seen in the context of the capital. The brick bands found there also appear at Malagina, a work of imperial restoration. The decoration of Asar is more complicated than that of the others, and its rows of vertical bricks without cloisonné paralleled only at Archangelus. Among the walls of the twelfth century, only a short section below the palace of the Blachernae, and the lake wall of Nicaea, display any more elaborate decoration. In defensive techniques, Hieron stands above the rest with its ditches and massive round towers; the others seem to exhibit the variety of shapes of towers already noted for the time of John. The round superstructure of Asar and the overshooting wall of Macre appear to be local peculiari-

ties. With the exception of Hieron, none of these reflects the skill or modernity of the walls of the Blachernae, but, of course, none of them had to face such a sophisticated enemy as the Normans or the Crusaders. There is no reason to think that they were not adequate for their purpose, or to suppose that advanced artillery was necessary to defend against swift mounted parties of Turkish raiders. In these cases, as often in the later or less prominent fortifications of Asia Minor, the latest technology was apparently not considered necessary.

THE THIRTEENTH CENTURY AND AFTER

The anarchy which the battle of Myriokephalon brought to Asia Minor was greatly exacerbated by the capture of Constantinople by the Fourth Crusade in 1204 and the dissolution of the Empire into mutually hostile fragments. Within a few years, however, the Lascarids of Nicaea managed to establish their control over the remaining Byzantine possessions in western Anatolia and to bring them a period of remarkable peace and prosperity. Between their defeat of the Turks in 1211 and the recapture of Constantinople in 1261, the Lascarids worked to increase the resources of the country, and to ensure its security by the construction of fortresses. The thirteenth century was one of the most active periods of fortification; it remains are widespread. Less is known of the subsequent period. Major repairs were carried out at Nicaea and Constantinople as long as they were Byzantine, but few provincial fortifications of the Palaeologan period have yet been identified, largely, it seems, because they lack a distinctive style of defence or masonry. A few, however, may be considered as final examples of the defence of Byzantine Asia Minor.

The earliest dated fortress of thirteenth century Asia Minor is not Lascarid, but was built by their rivals, the Grand Comneni of Trebizond. During the chaos after 1204, David, younger brother of the Trapezuntine ruler Alexius, pushed westward and soon brought the coasts of Paphlagonia and eastern Bithynia under his control. His most important acquisition was HERACLEA PONTICA, which he captured in 1205 and held until Theodore Lascaris took it from him in 1214. To provide a bulwark against the Lascarids, David built substantial walls around the city in 1207, a date provided by an inscription which still adorns one of the towers.⁷⁶

The new walls enclosed the ancient city site, more than a kilometre square on a large sloping hill overlooking the sea. They followed walls of the third century which had already excluded a large suburban area built up in Roman times. The tower with the inscription, in the lower part of the city, is distinguished from the rest by its more careful and decorative construction (fig. 29). The lower half of the facing, below the marble band of the inscription, is in large squared blocks, mostly spoils, arranged in regular courses. There is much brick in the joints, and in places a brick course runs partially across the face. A row of five column drums projects from the tower. Above the inscription, the masonry is of alternating brick, with smaller stones separated by single or double courses of brick. This tower stands alone in the use of such decor; the rest are uniformly faced in roughly arranged large blocks set in courses of varying width. They usually have much broken brick in the joints and occasionally one or more brick bands. In one case, a tower appears to have a base of brick, but this seems rather to be a very wide brick band which does not continue across the face. The towers are almost all square and set forty meters or more apart. Two pentagonal towers, however, with a separation of only 20 metres, form an exception and may belong to an earlier period of the fortifications; they employ a similar masonry of large spoils. In the upper part of the town, where fewer ruined stone buildings were at hand, the masonry is of smaller stones, with much patching in brick and rubble. The generally poor preservation of the walls, most of which are built over with houses, has obscured the defensive system. It is possible only to note that the tower with the inscription has

two narrow loopholes in the upper part, and that the gates were flanked by square towers at least 16 metres high.

The hilltop, some 160 metres above the sea, ends in a small plateau, not difficult to approach from the land behind. It was therefore adorned with a small citadel at a period different from that of the main walls. This has a court about 17 by 30 metres surrounded by walls and containing a cistern; its entrance gate is flanked by two massive towers. That on the west has been considered as a dwelling. Its base, as in the case of the other tower and the walls, is faced with large spoils, with some headers reaching into the core; the interior masonry is in alternating brick. The superstructure of the large tower is entirely in brick, and its two upper stories each contain two chambers with tall arched windows. There was apparently no access to these chambers from the interior, but only by ladders, or perhaps wooden structures, from the inside. This feature, inconvenient for a dwelling, suggests rather that the larger tower was intended for defence and that the windows are actually great embrasures to enable artillery to shoot down over the city. In its masonry, and perhaps in its elaborate defence, the citadel appears to be of different date from the city walls. A Genoese origin has been proposed, but an inscription found at an unknown point in the walls of Heraclea and now lost suggests a different attribution: its verses proclaim the construction of a tower by Theodore Lascaris.⁷⁷ The inscription could refer to the citadel which suits that period on historical and stylistic grounds. The alternating brick of the interior walls, as well as the superstructure of brick on a high base of spoils, find their parallel at Nicaea, as do the large vaulted embrasures. Lascaris, knowing the strategic importance of the fortress and its value for defending the coast of the Black Sea, would naturally have wished to strengthen it as part of the general fortification of his empire. This would have been especially the case after the Turkish capture of Sinope in 1214 gave a new and far more dangerous enemy a powerful base on the coast to the east. The citadel, therefore, may be considered as an example of his work.

The other fortifications of the thirteenth century, all Lascarid, fall into two major groups, one mostly in Lydia, the other in Ionia and Caria; they display somewhat differing styles of masonry and construction. The former is dated by historical texts and analogy, the latter more circumstantially but no less probably. Since both groups have been studied, only a few need be presented here in any detail.

The earliest dated fortification of these groups is at SMYRNA, restored by John Vatatzes in 1222/3, the first year of his reign. The walls of the castle, which stands some 175 metres above the sea, were extensively rebuilt, and a new wall constructed on the west side overlooking the city to create a fortress separated from the city walls.⁷⁸ The new wall had square and semicircular towers of varying sizes and provided two extra strengthening elements, a thin outer wall with small open-gorge towers facing the city, and a rectangular inner citadel. The citadel shared three of its corner towers with the main walls, and had a circular tower on the northeast facing the rest of the fortified area, a large rectangle about 600 by 200 metres. Elsewhere, the Lascarid fortifications followed the line of earlier Byzantine walls, themselves in many places built on Hellenistic foundations.⁷⁹ Later repairs and delapidation have removed most of the evidence for defensive techniques. In general, however the towers appear to have had solid bases, with one or two upper chambers and a crenellated platform reached by steps from the wallwalk. The main gate seems to have been a simple opening flanked by a single tower. There is some evidence to suggest that the wall contained a covered gallery with embrasures.

The masonry consists of rubble and spoils arranged in fairly straight courses whose width varies considerably with the material used. Horizontal single courses of brick sometimes stretch across the face; vertical brick often appears, but only occasionally forms a cloisonné.

In general, decorative patterns are lacking. The south gate, however, appears to have had a good deal of *cloisonné*, and the circular tower on the inside of the citadel exhibits some distinctive brick decoration (fig. 30). This stands above a band of three bricks and consists of a tree in broken brick which apparently had marble spoils inserted on either side, with a simplified tree design beyond them. But for the most part, the facing of these walls is functional rather than decorative.

During the reign of Vatatzes, MAGNESIA was the seat of the imperial administration, treasury and mint.⁸⁰ It was defended by a long city wall and upper citadel, both mentioned as constructions of Vatatzes. The lower wall, whose extensive circuit encloses an area appropriate to a substantial city, begins above the highest houses of the present town where a gateway, partially rebuilt in Turkish times, is preserved with its flanking towers and most of its thirteenth-century masonry. The exterior facing of the gate and east tower is of coursed mixed rubble and spoils with a good deal of intermittent *cloisonné*; bands of five bricks, sometimes partial; and many single brick courses. The less careful masonry of the inner face includes some traces of a herringbone pattern. The east tower has on its interior a circular vault of brick closely set in rows separated by narrow bands of mortar. The west tower, which has lost most of its facing, evidently had a base of similar style to the rest with a superstructure of brick anchored to the core by small round beams in widely-spaced rows (fig. 31). In all cases, the facing is superficial, the brick is reused, and there is much evidence of cribwork. This entrance was plainly more decorative than the rest of the lower walls whose facing, where visible, consists of roughly coursed rubble with an occasional brick band or course and scattered *cloisonné*.

For the most part, the masonry of the citadel was similarly undistinguished, with spoils, fieldstones and brick forming rough courses. In some cases, there are small brick fragments around the stones, and occasionally *cloisonné*. Most of the towers are square, one of them with a marble cornice. One round tower has a more elaborate decoration, with frequent courses or bands of brick and a simplified meander pattern which runs across the face (fig. 32). Neither here nor in the lower walls are the remains sufficiently well preserved (or studied) to enable any conclusions to be drawn about the defensive system, beyond the fact of a separate citadel.

While Magnesia was the administrative centre of the Empire, NYMPHAEUM, situated at the edge of a broad plain on the other side of Mount Sipylus, was the favoured residence of Vatatzes and his successors, and thus functionally the winter capital.⁸¹ The emperors no doubt lived in the palace which still stands in the plain; the fortress was high above it on a steeply-sloping hill detached by precipitous limestone outcrops from the neighbouring foothills of Mount Tmolus. The fortress is of a complicated plan, with at least two lower walls and an upper citadel, and several building periods. The wall which separates the lower bailey from the much larger citadel is insubstantially built because it can take advantage of steep rock faces. One pentagonal tower is fairly well preserved: it has a facing of roughly coursed rubble with irregularly alternating courses of brick; its upper section is decorated by a band of brick in a herring-bone pattern (fig. 33). Historical circumstances indicate a Lascarid origin for the fortress. The masonry of the lower wall, and in particular the herring-bone pattern which appears in walls of Vatatzes at Nicaea, confirm such a date for this section. The rest will be considered below.

The final dated Lascarid fortress is TRIPOLIS, on a steep hill overlooking the Maeander and the ancient site.⁸² One lone tower still stands amid the general ruin of the circuit. It is faced with spoils and fieldstones in straight courses, usually separated by single, double or triple courses of brick, but not in a regular alternating pattern. Vertical bricks occasionally appear without forming a *cloisonné*. The most notable feature of this masonry is a row of small reused capitals running across the face, the central piece decorated with a cross as if to give divine protection to what was evidently the large corner tower of the fortress.

Several other fortifications of Lydia have been dated to this period by analogy with these. They all have in common a masonry of coursed spoils and fieldstones with single courses or bands of brick inserted at irregular intervals, and sporadic *cloisonné*. The masonry is consistent over a wide area in its lack of regular decoration and general reliance on fieldstones and broken brick. Most of the smaller fortresses are preserved only in part and seem to have been relatively simple structures, consisting of curtain with round towers following the edges of hilltops. They had various functions: some were the walls of small towns, others protected roads or river crossings. In one case beside Nymphaeum, a pentagonal tower occurs, and another, ASAR in the Cayster valley, offers evidence of more advanced defensive techniques. Its south gate was recessed in such a way that an attacker had to make a sharp turn under the fire of an adjoining tower, while an enemy approaching the north gate would have to pass below an immediately adjacent round tower.⁸³

A second group, in Ionia and Caria, displays somewhat different features.⁸⁴ These are generally very small, some not more than 40 metres square, have a simpler masonry, but more elaborate defensive techniques. In most cases, they have few towers both round and square, and their walls are reinforced on the inside by a system of arches which served at the same time to support a wallwalk. Defence was carried out from the crenellated wallwalks and tower platforms as well as the loopholes of the tower chambers and sometimes from loopholes or embrasures in the walls. There is much evidence for wooden structures on the interior to provide access to the defensive zones. The masonry is almost universally without distinction, consisting of roughly coursed mortared rubble with a good deal of fragmentary brick. Most of these were apparently small forts for local defense, with an important series forming a chain of defences for the highway which led through southwestern Caria. One example may be examined more closely.

Heraclea ad Latmum, the Byzantine MELANOUDION stood on the edge of a lake over a small fraction of the ruins of a vast Hellenistic site to form a rectangle of about 90 by 35 metres.⁸⁵ It had square towers on the north side and reinforcing arches within the wall which supported the wallwalk. Some of these had loopholes at a high level, evidently reached by wooden stairs, while in others there were embrasures at a lower level, accessible from the ground.⁸⁶ The south gate was a narrow opening between two projecting parts of the wall, hardly towers, and the north gate opened immediately beside a square tower. The masonry is more regular than that of most of the other castles since the builders had at hand the abundant remains of a Hellenistic city and its walls. Most of the facing is thus of coursed rectangular spoils often mixed with fieldstones; the joints contain large amounts of broken brick and relatively little mortar (fig. 34). The blind arch above the north gate is decorated by a brick frieze, an unexpectedly fine feature here, and by bricks regularly set between the *voussoirs*. The history of the region leaves no doubt of the date of the castle, for Melanoudion was a regional administrative centre in the thirteenth century at a time when the famous neighbouring monasteries of Mount Latmus enjoyed the great period of prosperity which is attested by the remains of numerous Lascarid churches.⁸⁷

Another form of fortification is characteristic of this region, the walled monastery.⁸⁸ These display many of the features already noted: some are divided into upper citadel and lower bailey; others have internal supporting arches with embrasures and evidence of wooden structures; most have towers with loopholes. The masonry is usually like that of Melanoudion, though less regular because made of rubble with few spoils; brick fragments frequently fill the joints.

These dated examples enable a Lascarid style to be defined. It shows great variation between the large imperial foundations of Smyrna, Magnesia, Nymphaeum and Tripolis, and the smaller forts of Lydia, Ionia and Caria. The former cover large areas and were defended by frequent and often massive towers. Their systems of defence, where known, seem not to have been

elaborate, and their masonry is far less distinctive than that of earlier periods. Most make extensive use of roughly coursed spoils and rubble, with decoration limited to entrances and prominent exposed parts. Although differing in material, the walls of Pontic Heraclea followed the same principle; they appear related to the tradition of the capital and of Nicaea by employing alternating brick and superstructures entirely in brick in the earlier inscribed tower and later citadel respectively. In the southern half of the kingdom, the fortresses seem to follow (or create) a local tradition, with masonry far less complex than that of Nicaea, though perhaps comparable in quality with its outer wall, a product, like them, of the reign of Vatatzes. It would appear that the builders of Vatatzes were more concerned with function than appearance and that the elegance of Nicaea was largely confined to that capital. Defensive techniques are poorly known. Towers are square at Pontic Heraclea, round in the south; both have inner citadels, apparently a characteristic feature of this period (though there is none at Nicaea). Comparison of even the largest imperial fortresses with Nicaea provides evidence not so much of common elements, but of the overwhelming difference between the capital and the provinces, a phenomenon always notable in the case of Constantinople.

The smaller anonymous fortresses seem to follow regional patterns, both in masonry and defence. The Lydian walls use brick decoration in a restrained and irregular fashion; it is lacking in the others. In Ionia and Caria, plain rubble walls were common, with much broken brick in the facing and fragments of brick in the joints. The latter also appears, but not consistently, in Lydia. Both groups have small round beamholes and cribwork. The Carian fortresses appear to have had more complex defences, with reinforcing arches and embrasures in the walls, as well as wooden platforms, stairs or scaffolding. The most striking common feature of all, however, is their very small scale, which reflects the limited needs and resources of local defence.

The Lascarid characteristics defined by these dated monuments may be found in numerous other fortifications, large and small, in western Asia Minor. A few examples may be considered here, beginning with the largest.

The impressive ramparts of PEGAE on the south shore of the Sea of Marmora stretch for about 800 metres to isolate and protect a rocky promontory more than a kilometre long, and the harbour which lay beneath its cliffs (fig. 35). They enclosed a city which was of the greatest importance in the thirteenth century during the struggle between the Lascarids and the crusaders who ruled Constantinople. Late in 1204, the city became one of the first conquests of the Latins in Asia Minor, and remained in their hands until 1224. During this time, it was a major centre of Latin commerce and population and the base for their efforts to advance into Anatolia. The Lascarids thwarted their plans and soon reduced Pegae to the only Latin outpost in Asia Minor. After its recapture by Vatatzes, it became and remained one of the most important ports and military bases of the kingdom.

The approaches to the promontory were blocked by a ditch and a complex system of defences which was stronger on the more level southern part where traces of an outer wall and a reinforcing inner wall appear to be identifiable. Further investigation will be required to determine how these were related to the main gate, which has mostly disappeared. A series of pentagonal towers spaced 40 metres or more apart formed the primary defences of the wall; between them were occasional solid triangular bastions. Several of the towers were reinforced with triangular breastworks at ground level to keep enemy siege equipment away from their bases. The towers had lower circular chambers whose vaults would have supported an upper chamber; crenellated platforms probably crowned them, but have vanished with the general delapidation of the upper parts. An inner wall on the north, at a higher level than the rest, apparently enclosed a citadel.

The promontory contained at least one large cistern and was of an area sufficient to encompass a civil settlement of considerable size.

These walls appear to have been constructed in an unparalleled fashion. Each tower has a clear joint separating its facing and core from an inner structure of mortared rubble to suggest that they replaced an earlier ruined wall or were built in two stages. The absence of any regular facing on the interior structures and the fact that they consistently stand no higher than the level of the interior dome of the lower chamber shows that the latter is the preferable explanation.⁹⁰ In an initial stage, therefore, a crude rampart of rough semicircular towers stood only a few metres above the interior ground level, but was considerably higher viewed from outside. These presumably sufficed to protect the town while the new, larger walls were under construction.

The consistent masonry of the towers indicates one period of construction. It has a facing in brick, closely set in straight courses with mortar joints equal to or thicker than the bricks. The bricks are long and thin and of varying size; they seem to represent a mixture of new and reused material. In many places, they are arranged in a curious fashion with small brick fragments regularly inserted between them, an arrangement which seems to be unique (fig. 36). Bases of the towers are often of alternating brick with much cloisonné; the facing was joined to the core by cribwork whose small round beamholes are manifest in regular rows. The triangular breastworks are of a cruder construction, with roughly coursed rubble and a great deal of irregular brick filling; this strongly resembles the interior masonry of the towers. On the north, a wall which may form part of the citadel is more highly decorative, using single or double courses of brick between each row of stones and extensive regular cloisonné. It bears in addition a brick meander pattern set between parallel brick courses (fig. 37). The wall which appears to reinforce the southern part of the fortifications is similar, with alternating brick, a good deal of cloisonné, and a widespread system of cribwork.

The two apparent stages of construction imply that the fortifications were built at a time of active threat and were designed against an enemy of some power and sophistication. Since no trace of earlier fortifications is evident, it is possible that construction of the new wall proceeded while demolition of the old ones was in progress or had been completed. The rough low wall along the escarpment above the ditch could have afforded temporary protection at such a time when the city would have been extremely vulnerable. The ditch itself, along with the breastworks and the high towers, implies threat from an enemy more advanced than Turkish tribesmen. The masonry provides a clue to the date and circumstances. Its brickwork, whether alternating, cloisonné, in decorative patterns or forming a superstructure, points to the Lascarid period. The close arrangement of the bricks and the variety of styles suit characteristics already observed at Nicaea. A Lascarid wall would have been built against the Latins, from whom the city had been taken and who might at any time attempt to reconquer it by themselves or, more probably, with the aid of one of their powerful western allies. Such an enemy might strike suddenly and come armed with the best siege machinery. Under such circumstances, the wall would naturally have been built as if attack were imminent and in preparation for a well-equipped adversary. Pegae, therefore, may be classed with the fortresses of Vatatzes and seen by its extensive use of brick to belong to the northern group with Nicaea, to which it bears the closest resemblance, and the citadel of Pontic Heraclea.

The characteristics of a few smaller fortifications suggest that they, too, may be assigned to this period. The largest, LENTIANA, is situated in the northern part of Mysia between lakes Apollonias and Manyas.⁹¹ Like Pegae, it was the scene of considerable fighting between Crusaders and Lascarids until it fell to Vatatzes in 1224. The fortress occupies the top of a low pear-shaped hill overlooking a tributary of the Macestus and a broad plain which was no doubt marshy be-

fore the advent of modern drainage. The hill forms the only prominent feature of the landscape for some distance around. A few towers stand almost to their full height; traces of the rest, with most of the curtain, may be followed. Undergrowth and delapidation obscure most of the defensive features of what appears to have been a relatively simple structure, but its masonry is indicative of a period. The towers are faced with coursed mortared rubble mixed with brick, often covered with a thick shelter coat. The bases use brick in an occasional, but perhaps accidental, *cloisonné*, while the upper courses are punctuated by bands or two or three bricks. Some towers have decorative bands which form a herringbone or meander pattern between parallel brick courses (fig. 38). The bricks are all reused and include fragments of pottery; cribwork is evident throughout. This masonry invites comparison with the Lydian group of fortresses by its rough mortared rubble and narrow brick courses — it bears the closest resemblance perhaps to Asar — but displays a more regular use of brick bands than they. Its decorative features resemble those already noted at Nicaea and Pegae, and provide further evidence for association with the Lascarid fortresses.

A castle which might have been of similar size stands in a far more scenic location over the crossing of a tributary of the Sangarius, on the route from Prusa to the east.⁹² It justifies its modern name, *IKI KULE*, “Two Towers” by consisting of those and little else. Beside protecting the road and river crossing, it guards a small and fertile plain between high parallel ridges. The open-gorge towers were bonded to the curtain which would have surrounded the low detached hill (fig. 39). They were evidently divided into three storeys by wooden floors. Construction and masonry are consistent throughout to indicate a single building period. The core contains fieldstones and occasional brick set in a white mortar with small black pebbles. Over this is a facing in alternating brick with single, double or triple courses of brick between each row of fieldstones. A great deal of mortar covers the rough unshaped stones to produce a smooth surface and a decorative effect reminiscent of covered brick. Small round beams arranged in regular rows reflect the extensive system of cribwork. Together with the facing, this cribwork is so reminiscent of Lascarid walls at Nicaea that the association of this castle with that period is natural. Its identification, however, has not been established.

Even fewer traces remain of another fortress in Bithynia which fortunately was studied at the beginning of this century, when most of it was still standing.⁹³ A few sections of the walls of Kite, the Byzantine *KATOIKIA*, between Prusa and Lake Apollonias, represent an irregular hexagon whose largest dimension was about 130 metres. The towers, now vanished, were placed at irregular intervals and were of horseshoe, triangular and hexagonal shape; square towers flanked the single gate. Bricks separated the *voussoirs* in the arches of the gate. The surviving parts display a masonry of rubble with occasional spoils in fairly regular courses, separated at intervals by single courses of brick (fig. 40). The courses sometimes alternate with the stones, sometimes run for short distances at irregular intervals, and at the top and bottom form regular courses which run the length of the wall. Cribwork is evident throughout. The walls had a shelter coat of hard grey mortar which would have given them a better appearance, reminiscent of the Lascarid walls of Nicaea where coats of mortar often cover the rubble surface. This feature, as well as the bricks in the arch and the general use of rubble with brick courses, indicates a date in the Lascarid period. The fortress was evidently a modest specimen of their work, suitable for the needs of local defence. Such a role was manifest the only time *Katoikia* appears in history, during the Ottoman attack of 1307, when the contemporary historian Pachymeres records that a multitude of women and children of the neighbourhood fled into the fortress.⁹⁴

A recently studied small fort in Caria seems also to belong to this period. The walls of

AMYZON in Caria, built over the precinct wall of the ancient temple, cover an area of about 75 by 60 metres and are reinforced on the west side by two round towers.⁹⁵ The lower portions of the walls are built with large spoils taken from the temple, while the upper parts and the towers are in regularly coursed rubble with a good deal of fragmentary brick, not in a decorative pattern. In its size and masonry, this fort resembles others in the region which have been attributed to the thirteenth century. A small excavation within the precinct revealed Byzantine walls, *pithoi*, and some green and yellow glazed pottery which could be of that date. The historical record is naturally exiguous: the small and remote place is mentioned in the tenth century, had bishops throughout the Byzantine period, and appears in documents of Lascarid date. The Lascarid age therefore appears the most probable for the fort.

Finally, a large fortress attributed to the Lascarids seems not to belong to them at all, and may serve to illustrate some of the problems which these late fortifications present.⁹⁶ The ‘Lascarid’ walls of METROPOLIS in Ionia form a rectangle of 110 by 42 metres down the broad slope of a hill which has a commanding view over the lower plain of the Cayster. The approach is defended by two projecting square towers at the base of the rectangle; they have tall and narrow loopholes toward the entrance and the lower slope. The masonry has suggested the attribution. It employs a core of mortared rubble with a facing of mixed spoils and fieldstones in fairly regular courses (fig. 41). Large spoils form the lower courses and quoins; elsewhere the stones are unsorted and set with a great deal of broken brick and pottery, and with some small flat stones as levelling courses. In places, brick fragments are laid one on another to fill a large gap. Brick seems nowhere to form courses, *cloisonné* or regular patterns. The arches of the gate employ flat stones and some brick between the *voussoirs*. This masonry seems to lack the characteristics of Lascarid work. Its rubble forms more varied courses and its use of brick is distinctly different. The lack of brick is particularly notable in those prominently visible parts where it would be expected, as well as in the arches where the Lascarids normally employed bricks carefully inserted between the *voussoirs*. The small piles of broken brick which sometimes fill gaps are typical of Turkish masonry. It seems most probable that the fort belongs to a period after the Byzantine, perhaps that of the princes of Aydin, who ruled from nearby Ephesus.⁹⁷ The regularity of plan and some of the defensive techniques, such as the tall loopholes which do not occur in Byzantine fortifications of this time and region, also suggest a Turkish origin. Finds from the survey, which include unspecified ‘Islamic’ coins but make no mention of Byzantine material, may offer further confirmation.⁹⁸

Such a problem of identification raises important questions of method to be considered in this context: a typology of Turkish fortifications needs to be established for each region to help in determining whether a fortress is of late Byzantine or early Turkish origin. In general, the Turkish forts employ more advanced techniques, and different styles of masonry, with a careful and regular decoration, or with an undecorated facing hardly distinguished from the core. The latter is more common and seems to be represented here.

The same walls offer another problem of identification of period. The fortress consists of two parts: above the lower rectangle is an oval circuit to which it appears to have been added. The upper walls are built with extremely well-cut large blocks laid in accurate straight courses. They have been taken as evidence for a Hellenistic origin of the fortress, especially because of the regular indented trace which some of them follow. Unfortunately for such an hypothesis, the stones are a facing over a core of mortared rubble and are set in a hard grey mortar with small pebbles. Such techniques are characteristic not of the Hellenistic but of the late antique and Byzantine periods. By its careful use of spoils, probably taken from an earlier wall, this part of the fortification would appear to date to the Dark Ages. The fortifications of that period often

used an indented trace, though rarely so regular as this. Their line, like the fine blocks, suggests that the Byzantines were following an earlier, Hellenistic, wall and perhaps even incorporated much of it into their fortress. Most of the visible remains, however, are evidently of the period of reuse.

Evidence for the following Palaeologan period is far less satisfactory. The recapture of Constantinople in 1261 directed imperial attention to the West while religious and political problems allowed the defence of Asia Minor to crumble; within a short time the whole country was exposed to constant attack. By the end of the century, the Turks were well established in the fertile plains of the Aegean region, and soon only a few fortified towns held out like islands in the flood. The first three decades of the fourteenth century saw the loss of most of the remaining Byzantine possessions in Asia Minor, leaving only a few well-fortified ports and the walled city of Philadelphia in imperial hands. This was naturally an epoch when fortification was necessary, and much rebuilding was certainly done. The resources of the empire, however, were usually directed elsewhere so that few, if any, new fortresses were constructed on a large scale. The monuments which can be identified are in an undistinguished masonry which is of little help in defining a style or in providing comparative material for discovering others. Further study of these, as of the early Turkish remains, will be necessary before the fortifications of the period can be appreciated. It is, however, possible to consider a few identified examples.

The most extensive systems of Palaeologan fortification appear at Constantinople and Nicaea, whose ramparts were kept in a state of readiness until the end of Byzantine rule. The walls of the capital display several styles which admit of no precise dating. They appear to begin with the complex rhythmic alternation of brick and stone found at the Blachernae and to proceed to the plain undecorated stonework of the fifteenth century. Intermediate stages are represented by types of masonry which use an irregular or desultory brick decoration, and seems to represent the gradual disappearance of brick — once functional but now purely decorative — in these walls where it had such a long history. At the same time, the defences underwent substantial changes indicative of reduced manpower and the need for greater range. In these, many openings were blocked and towers and walls raised. The final stage, in which the beginnings of adaptation to gunpowder appear, is naturally confined to Constantinople. Developments at Nicaea were similar: the complex brick patterns of the early Palaeologan masonry eventually yield to a crude alternation of brick and stone and, in a late period which is unlikely to antedate the fourteenth century, many openings were blocked and towers raised. In these cases, the walls were apparently being adapted to a technology which had been new to the capital more than a century earlier.

A fortress in the immediate neighbourhood of the capital, *HIERON* on the Bosphorus, was extensively rebuilt in this period; the work of the Palaeologi is attested by their monogram of four Bs which adorns the top of the blocking of the original gateway.⁹⁹ The modifications involved rebuilding or raising the main towers and installing embrasures there, as well as the construction of a new wall to divide the castle into an upper citadel and much larger lower bailey. This wall had four solid bastions, two round and two square, which barely rose above the level of the curtain. Their massive solidity would have been suitable for the installation of trebuchets whose missiles could easily have reached the shore. These changes are executed in the unadorned Palaeologan style typical of Constantinople, with roughly coursed fieldstones in much mortar and numerous small round beamholes in regular rows. They probably belong to the fourteenth century, before the occupation of the castle by the Genoese in about 1350.

It is probable that the Palaeologi were responsible for a major rebuilding of the fortress of *NYMPHAEUM*, where the larger upper citadel manifests a style quite different from that of the Las-

carid walls below. This includes a gate which faces away from the fortress and is thus concealed from an approaching enemy. In its present state, this gate has a pointed arch, evidently of Turkish origin but clearly part of a rebuilding; the original plan could well have been Byzantine. Most of the masonry of the upper part is far cruder than anything usually associated with the thirteenth century, consisting of small rubble barely arranged in courses (fig. 42). A great quantity of brick fragments is mixed with the stones, sometimes surrounding them or sometimes forming a short, desultory course. However poor the appearance of this masonry, it has the distinct Byzantine characteristic of a facing: the brick appears only on the surface, and was presumably intended to be decorative. It was anchored to the core by small round beams at irregular intervals. In this case, a date may be suggested. According to the contemporary historian Pachymeres, Constantine, the younger brother of the emperor Andronicus II, built some part of the fortifications of *Nymphaeum* in 1292. His work could have involved a substantial reconstruction of the citadel: if so, it would provide a rare dated example of masonry of this period.¹⁰⁰

There are no doubt many other Palaeologan fortifications to be discovered in Asia Minor. The needs of defence would have produced much construction and rebuilding and it is probable that many of the small forts in the area subject to Turkish attack date from these times. Since their study involves considerable discussion of historical geography and Ottoman history, they lie outside the scope of the present work. A Palaeologan date has been assigned to a few; it is possible that others attributed to earlier periods may belong here.¹⁰¹ Only further research will enlarge the picture of local defence in the last days of the Byzantine empire.

General Summary

LATE ANTIQUE AND BYZANTINE MASONRY TYPES

This summary of some Anatolian fortifications, along with the detailed studies of Part II, may give an impression of the complexity of masonry found in a relatively small area. At first sight, the abundance of styles and techniques of construction may indeed seem bewildering, but a classification based on dated material can bring some order and serve as a base for approaching undated and unstudied remains. The main lines may be summarised in a chronological survey; the techniques of defence will be discussed in the following section.

The first age of widespread fortification reveals distinctions which will appear in all following periods. The imperial foundation of Nicaea seems to have little in common with the rest; like them, however, it follows the basic principle of consisting of a core of mortared rubble with a facing — here, of brick in the towers and coursed rubble in the walls. Facing and core had to be attached to give cohesion and stability to the walls. In the towers of Nicaea, brick courses extending far into the core performed this function, as did bands of brick extending through the walls. The walls thus had a facing of coursed rubble and brick bands, the towers entirely of brick, while the gates employed a fine ashlar in direct imitation of the triumphal arches which some of them incorporated. The great care expended on these walls invites comparison with the contemporary but far greater rampart of Rome. This, too, has towers faced with brick anchored to the core in a similar way, and gates of fine ashlar; its walls, however, are also faced with brick, and the whole structure is on a grandiose scale appropriate to the capital of a vast empire.¹⁰²

By contrast, the local fortifications of the third century, mostly city walls, are faced with rubble at Sardis and Philadelphia, while others use spoils. Aesthetic considerations were never absent: the rubble of Sardis was covered with plaster in imitation of ashlar, and the spoils often formed a pattern of alternating broad and narrow courses. The spoils were usually taken from disused structures or graveyards. The builders of these walls had to face the same problem of anchoring the facing to the core. Where spoils of varying shapes were available, a system of headers and stretchers was employed, with longer blocks extending into the core. Column drums were inserted, especially at the base of the walls, and large blocks perpendicular to the facing appeared at Miletus as reinforcing as well as bonding. This was probably done in imitation of the Hellenistic system of casemates whose remains would have been visible on the site. At Sardis alone, wooden beams were preferred, a cheap and practical solution with a long future in the Byzantine period.

Late Antiquity, to judge from few and probably untypical examples, favoured a facing in fine ashlar with brick bands running through the walls. This system was used throughout the Theodosian walls of Constantinople, and perhaps at Smyrna. In the Long Walls of Thrace, the ashlar appears without the brick bands.

Walls of the Dark Ages exhibit a great variety of style and quality of masonry, usually employing a facing of spoils. At the great military bases of Nicaea, Malagina and Ankara, the spoils are arranged with considerable attention to aesthetic effect as well as efficiency to produce a smooth surface resistant to the elements and striking in appearance. Brick bands appear rarely if at all, perhaps because the great abundance of material for reuse provided sufficient means of bonding facing and core. The spoils are so finely laid as to approximate ashlar, and thus be stable in themselves; column drums and architectural fragments were a favoured means of binding facing to core. The same principles are followed in local defences, but rarely with such care and accuracy. In most cases, regularly coursed spoils cover the walls and often provide a decoration. At Pergamum, exceptionally, they appear to have been clamped together, probably another example of the influence of surviving ancient walls. There as elsewhere, column drums were a common means of bonding. The walls of the refuge sites make a distinctly different impression reflecting their different nature. Most of them have a rough and practical facing of rubble and little brick, suitable, no doubt, to the limited needs of walls in remote locations where appearance was unimportant.

Brick reappears on a large scale in the ninth century, when the use and arrangement of spoils underwent notable change. In the walls of Nicephorus at Ankara and of Michael II and Theophilus at Constantinople, towers have bases of spoils and superstructures of brick. The spoils are well cut and joined, with brick bands in the capital, and in less regular courses at Ankara. By the middle of the century, brick bands appear at Nicaea and Ankara in an alternation with rows of spoils less regular than that of earlier centuries (the imitation of earlier masonry at Constantinople and Nicaea need not be discussed here). The changing use of spoils reflects a contemporary reality. In the cities of the seventh century, abandoned and ruined buildings of all kinds were readily available as sources of building material. By the ninth, however, stones of good quality were scarcer: many had been used already, and a great number would have gone into the kilns to be burned into lime for mortar. The pieces which were left would have been fewer and in worse condition, for a building which had lain in ruins for two centuries was unlikely to produce many fine squared blocks. Consequently, the quality of the spoils is lower and less suitable for the construction of the elegant facing of earlier years. Except at Constantinople, where special effort could be made to cut stones, and where earlier walls had not included reused material, spoils were no longer available to make anything resembling ashlar. The walls

of the ninth century and later thus employ roughly coursed broken spoils, with large gaps to be filled with small stones and brick; the brick bands were now necessary as lacing courses as well as bonding. Brick thus became and remained an essential feature of Byzantine walls.

Extensive fortification began again in the late eleventh century, usually in a style easy to distinguish from earlier work by its use of brick. The first fortresses of the period, those of Alexius, have a somewhat irregular facing of spoils or fieldstones, some in an evidently hasty effort, others reflecting the traditions of areas where brick was not in common use. Before that time, however, an element of fundamental importance began to appear or reappear in the regions here studied. In towers and walls built at Nicaea after the earthquake of 1065, cribwork was employed for an internal bonding. As explained in Part I, this method had a long history, but in western Anatolia it appears occasionally in the third century and only rarely thereafter until the eleventh. Its absence probably reflects the availability of column drums and other spoils suitable for the purpose. There is, however, no reason to suppose that a system of timber reinforcement ever went out of use, especially in places where few spoils were at hand.¹⁰³ It in any case becomes a regular feature of walls until the end of the Byzantine period and long after. At the same time and place, recessed brick first appears in fortifications. With its many variants, it was to be of importance for centuries.

The fortifications of John and Manuel Comnenus made frequent, sometimes abundant, use of brick. This appears most commonly in the form of lacing courses which produce an alternating or covered brick, and as cloisonné, elements which assume considerable prominence in the twelfth and thirteenth centuries. Initially, the brick would have had the practical purpose of compensating for the irregular sizes of broken spoils and fieldstones by ordering the facing into a regular series of courses. The cloisonné, likewise, would have defined the width of the courses. Soon, however, the brickwork began to assume the decorative function which was to become the more important. In general, the walls of John appear to use brick more regularly than those of Manuel, and alternating brick becomes widespread at Constantinople and Nicaea. An alternating brick supplants the traditional banded masonry in the walls of the Blachernae, and a facing of cloisonné adorns the walls below the palace, as it did the lake front at Nicaea.

At the same time, many walls are far less regular in appearance, with scattered cloisonné and desultory brick courses. They reflect another phenomenon of importance in the twelfth and thirteenth centuries, the considerable discrepancy of style between highly exposed and visible parts of the walls, and the rest. For the less prominent parts, a facing of roughly coursed rubble with little if any regular brickwork was considered sufficient. The idea of a regular or consistent facing through an entire fortification was evidently no longer thought important.

The masonry of the numerous fortifications of the Lascarid empire reflects trends which began under the Comneni. Nicaea, now the capital, is in a class of its own with its abundance of styles of decorative brickwork. Its outer wall, however, is typical in showing a clear contrast between the irregular alternating brick of the circuit and the decorative work of the gates. In this period, regional differences become pronounced. The northern fortresses of Heraclea and Pegae have much in common with Nicaea in their decorative and extensive use of brick, while those of Lydia are more restrained in their decoration and seem never to use a facing entirely of brick, and the Carian fortresses are of an even plainer appearance. Even though the traditional distinction between imperial and local fortifications is still much in evidence, the great fortresses of Magnesia and Smyrna, built by Vatatzes, employ a masonry of roughly coursed rubble with little regular brickwork.

By the thirteenth century, the whole notion of masonry was changing so that well defined fac-

ings, where they appear, are usually quite superficial, rarely (except at Nicaea) extending more than the width of a brick into the core. The period also sees the extensive use of shelter coats of mortar. This begins under the Comneni in the context of alternating brick and cloisonné, where a coating of mortar was often added to the surface in a manner both decorative and practical. It serves to cover the rough rubble and to give the illusion of a smooth wall decorated with brick. The smoothness of the surface, however, had a dual function beside decoration: it would prevent an enemy from gaining an easy hold for scaling the walls, and it would protect the rubble from the elements, for a rough projecting surface would encourage the slow penetration of water and the consequent deterioration of the inner mortar. Under the Lascarids, such shelter coats become more widespread, and are applied independent of any brick decoration. Cribwork also appears to have been universal at the time, with regularly hewn square beams in major fortifications of Theodore, and small round tree trunks or branches in the others.

Palaeologan work is poorly known outside the main centres, but would seem to represent a continuation of the Lascarid. In a few cases, brick courses are arranged in a complex and obviously decorative pattern which conveys a curiously feeble impression; these bricks are thin and form a shallow facade. Most walls, however, display the simplest masonry, eschewing decoration altogether, and making only the most desultory use of brick courses. Constantinople reveals stages of development in which the brick courses seem to become constantly less defined until they finally disappear altogether to yield to a plain and regular masonry of small coursed stones. This differs little from contemporary Turkish masonry in which the facing is hardly distinguished from the core. However poor the masonry of this last period may appear, it is important to remember the obvious fact that much of it is still standing; that is, it was solidly built and did its job for many centuries. In this, the importance of the core, as discussed in Part I, is evident. The facing, which had originally been the most important part of a wall, was purely decorative in the late period, and could be abandoned without any loss to the structure.

DEFENCES AND FUNCTIONS OF THE FORTIFICATIONS

The methods by which the fortifications performed their work of defence changed like the masonry in the millenium here studied. Similarly, the types of fortification commonly erected were rarely the same from one period to another. The changing techniques of defence and the functions may be considered together.

In the late third century, the pressing need of this area well within the frontiers was of walls to protect the cities, previously undefended centres of wealth and population, from the sudden and unwelcome attentions of the barbarians. The fortifications, therefore, are long walls to surround the entire urban area; they protect without destroying, not overriding or damaging classical buildings. Nicaea is uncharacteristic and outstanding with its regularly spaced round towers and complex double gates. The others have much in common, usually employing a long irregular trace with frequent indentations and few if any towers. In this, they probably follow the model of Hellenistic walls, which would have been the most recent fortifications on these sites; many of them would have still stood in a good state of preservation. Most of the third century walls are thin, though at Sardis at least reinforced with a mass of earth.

The two late antique ramparts whose details are known, those of Constantinople and of Thrace, shared the essential purpose of protecting the capital. Their defences were thus of the strongest kind: the great triple bulwark of the city, and the long wall reinforced by forts, far to the west. The walls of the capital represented the latest in military technology and formed an example of what could be done when the resources of an entire empire were available. They cannot, therefore, be considered typical, nor, as it appears, was their impressive and lavish model one

which others could afford to follow. Nothing comparable will be found until Nicaea briefly became the capital and imitated some of its features on a smaller scale.

The Dark Ages, a time of profound crisis and transformation, began with devastating attacks which necessarily provoked a vast range of defensive construction. The new fortifications are of several kinds, some characteristic of the period, others foreshadowing future developments. In western Asia Minor, the new circuits of reduced cities are widely prevalent. Some places retained a substantial urban area, others became mere hilltop fortresses; the distinction between city walls and fortresses tended to become meaningless. Such fortifications are to be found throughout the country, wherever urban life had flourished in Late Antiquity. Related to them is the fortress of Ankara which represented the transformation of classical civilisation in a different way, as a capital of a province of the militarised empire. It was thus one of the great centres of Asia Minor, and had the further role, to be found in many later fortresses, of protecting a major highway and road junction. This was also the role of the great fortress of Malagina, one of the stages and imperial stopping points on the main highway from the capital to the eastern frontier. The final group of fortifications is of a new kind symbolic of the age — the refuge sites into which the population of settled areas could flee from Arab attacks.

The differing functions of the walls produced different methods of fortification. The most elaborate and strongest were those of the provincial capitals, Nicaea, which inherited an ancient circuit, and Ankara, where a new system of defence was introduced. Unique among its contemporaries, Ankara employed closely set pentagonal towers of the same height as the wall, and a sophisticated bent gateway. These two, along with the walls of Constantinople, are the only ones which have many towers. Malagina, though built with care and designed for strength, uses triangular bastions and perhaps one tower. Such bastions were more characteristic of the city walls, where towers rarely appear and where gates tend to be simple structures. Ephesus with its double gateways is a partial exception; on the hill of Saint John the gate is flanked by massive square towers (made pentagonal in a later rebuilding of the period), while the town wall, like that of Miletus, has a single tower by its gate. Both places have a citadel. Most of the city walls followed a complex trace of the kind already familiar. Since these areas had not needed defence for three centuries, the most recent walls at hand would have been those of the third century, suitable as models to populations which may have been left to their own devices. The defensive systems of the cities, though highly varied and evidently showing elements of experimentation, are far less impressive than those of the imperial foundations, whether new or restored. The refuge sites appear to have been very simple, relying as much on steep hills and remote locations as on their walls.

Restoration and expansion were important in the ninth century, if it is possible to judge from the remains of Nicaea and Ankara. Towers inserted in the former doubled the strength of part of the circuit, which apparently gained the additional defence of upper tower chambers. In Ankara a new outer wall of more conventional type, with massive square and round towers, was added along with the citadel early in the century, while Michael III extensively rebuilt the walls with a complex system of defence using covered galleries with embrasures in walls and towers, and upper crenellated wallwalk and platforms throughout. The contemporary defences of Constantinople, where they do not follow the model of earlier walls, include similar galleries and platforms, as well as high massive towers. The sea walls employ a comparable system to suggest that the period was one of some technological advance.

The Comneni presided over the next great age of fortification, building a great variety of defensive works. In the first stage, these were seacoast forts to establish imperial control in a land largely lost and to serve as bases for further conquest. John Comnenus likewise constructed

many castles at strategic points for control and advance. Lopadium, for example, protected a bridge and main highway and was of a design suitable for a camp where armies could be mustered against the Turks. Achyraous like many others guarded a main highway, while Anaea performed a similar function for the coastal routes of shipping. For Manuel, consolidation of imperial control with security for the peasants whose revenues supported the state was an aim fulfilled in part by the construction of the Neocastra. These included city walls, as at Pergamum, and hilltop forts like Asar. Both, along with Archangelus which probably belonged to the same system, stood at the edge of broad and fertile plains, the site of intensive cultivation if left in peace. They thus protected the routes along the valleys from attack and offered refuge in time of trouble. Manuel was particularly concerned with the defence of the capital, now faced with the armed might of the West whose technology was equalling or surpassing that of Byzantium. Beside strengthening the walls of the Blachernae, he built the castle of Hieron which protected the approach by sea from the north. Elsewhere, his work involved the reconstruction of older castles, often with a more advanced system of defence.

The Comnenian fortifications reveal changing and improving defences. Little can be said of the early fortresses, but those of John invariably use projecting towers at moderate intervals and in a great variety of shapes. The towers of Achyraous seem large in proportion to the circuit; at Anaea they include a substantial corner tower. In both places, the main gate is defended not by flanking towers but by bends in the wall, and by towers which overlook the approaching road. Lopadium is unusual in reviving the ancient rectangular plan, suitable for a camp, though here enclosing a large area. The fortresses of Manuel, who had a passion for all things western, contain many innovations, some of them certainly influenced by developments in Europe. The walls of the Blachernae are the most notable example, with their adaptation to the new military technology of trebuchet and crossbow, steps felt necessary in the capital but apparently not elsewhere. Other fortresses, which continue to use towers of varying shapes, show similarly sophisticated features. The approach to Hieron is obstructed by a ditch and guarded by the powerful flanking towers of the gate, Macre has a wall designed to overshoot the lower circuit, and Malagina a new and massive catapult platform to control the approaches from the valley. This reign, like the seventh century, appears to have been a time of experimentation.

The peace and prosperity which the Lascarids maintained in their kingdom for half a century was secured in part by a system of fortification in every part of their domains. In some areas, this involved the construction or rebuilding of long city walls, as at Nicaea, Magnesia and Heraclea, or of the walls of reduced cities, as Tripolis and probably Smyrna. These protected the capitals and main economic centres, particularly the ports, of the country. At Nymphaeum, a large fortress defended the favoured residence of the emperors, at Pegae a new and powerful circuit protected a strategic threatened seaport. For the most part, however, the fortifications were on a small scale, suitable to local needs, whether to guard roads or river crossings or to provide refuge. Among them, the chain of forts which guarded the road from Miletus to Mylasa is especially noteworthy.

The Lascarid fortifications display a great variety of defences, with the most impressive in the capital. Nicaea was adorned with many new and tall towers by Theodore Lascaris – these often have large arched embrasures for heavier artillery – while John Vatatzes built the entire outer wall, no doubt in imitation of Constantinople. In the north, Heraclea received a new citadel which had a massive tower with large embrasures, and Pegae was endowed with an exceptionally powerful rampart which included a ditch, towers heavily reinforced at the base, and a citadel. The latter was a common addition of the time, appearing also at Magnesia and Smyrna, where there was also a small partial outer wall. These large fortresses display an advanced technology

which sometimes appears on a smaller scale in the local forts. Many of these seem to have been very simple, but Asar in Lydia has complex gateways, and most of the Carian forts have two defensive zones in the wall and evidence of inner structures of wood. Towers are of all shapes, though perhaps with less variety within a circuit than in the Comnenian period. In some cases, solid triangular bastions appear, apparently a revival of a much earlier practice.

The poorly known fortresses of the Palaeologi appear to have been built for the immediate needs of survival, yet the few larger examples reveal distinctive trends. Upper citadels were added to Nymphaeum and Hieron, defended in the latter by a solid wall suitable for the installation of the trebuchet. Constantinople where, of course Byzantine rule lasted longest, displays the characteristic phenomena of blocking and raising, the first no doubt in adaptation to diminished manpower, the raising to meet improved techniques of the enemy. A final vain effort strengthened and simplified the outer wall and added loopholes for guns, the last trace of changing technology. Similar modifications were made at Nicaea for another reason. The forces available to defend the city in the fourteenth century would hardly have been adequate to man the long double circuit, so that many loopholes and embrasures were blocked. At the same time, evidently the early fourteenth century, the last days of the Byzantine city, the towers were raised and strengthened in a way which would have made them suitable for trebuchets. At first sight, this seems a normal if belated development, yet the reasons for such an amplified system of defence have important implications. The enemy in this case was not the heavily armed Norman or Crusader of the west, but the largely nomadic Ottoman tribesman. If such defences were needed against people who were supposed to be capable of taking walled cities only by blockade, it may be necessary to reconsider the military arts of the Turks and to see them as technologically more advanced than has been supposed.¹⁰⁴

Taken as a whole, the thousand years of fortification here surveyed represent neither the unprogressive immobility often associated with Byzantium nor the dramatic technical progress attributed to the medieval West. Immobility would indeed seem dominant at first sight, since the greatest fortifications of the Byzantine Empire as long as it existed were built in the fifth century – Constantinople and Thessalonica – or even the third – Nicaea; at the end, in other words, the Empire was being defended by walls a thousand years old. Yet these were constantly modified and improved, so that the end of the Empire saw them more powerful and sophisticated than ever. The Byzantines never ceased to build solid masonry fortresses throughout the area they controlled, with appropriate levels of skill against enemies as varied as Huns, Persians, Arabs, Slavs, Normans, Crusaders or Turks. For the most part, the effort was successful, and the walls of the Empire survived the fall of the West by a thousand years until they were battered down by the cannon of the Turks. By then, of course, the Empire was in a state of collapse, but not – except perhaps for the latest period – through any deficiency in fortification.

Comparison with western Europe is most instructive. The two halves of the Roman empire were equally well fortified at the beginning of the fifth century. During Late Antiquity, however, the art of fortification gradually declined in the West, while the East maintained and improved it, culminating in the vast constructions of Justinian. The Dark Ages, which provoked a great retrenchment in Byzantium, nevertheless produced a variety of substantial, often massive, fortresses, some showing a high and novel degree of experimentation. Nothing in the early medieval West can compare with the ramparts of Ankara or Cotyaeum, or, for that matter, with the stone walls of most of the reduced cities. Byzantium was far in advance of the rest of Europe until the age of the Comneni, when the castles of the Crusaders begin to reflect a West whose skills were approaching those of the East. By the end of that period, innovation was more pronounced in the West, but the castles of Manuel still reveal the Byzantine ability to adapt

to new technology and new enemies. Byzantium went on building until the end, and their major fortresses of the thirteenth century are as powerful as those of western Europe, if notably less sophisticated in entrances and outworks. The majority, however, were small and simple, adequate for defence against the most insidious adversary, the Turkish tribesmen. Yet the Turks, too, had adapted to the times by developing suitable means of attack, for they were ultimately the product of the Seljuk culture whose great thirteenth-century fortresses were far more ambitious and powerful than contemporary Byzantine work. The present study, however, must omit these and the comparison which merits study. By concentrating on Asia Minor, it leaves the Byzantine provinces in the early fourteenth century. Had its sphere extended to Greece, some developments comparable to the West would have been presented, but the general image, of an ever-weakening society in these last years, would not have changed.

Byzantium thus continually built and adapted. Its fortresses successfully did a job which has largely been ignored because so little of the material has been accessible for study or sufficiently well dated to support conclusions. It has been our hope, by concentrating (in considerable detail) on methods of dating, to introduce a body of fortifications in a chronological sequence, so that they could reveal developments and invite comparison with better known material elsewhere. Much remains to be done in dating and organising the vast number of fortifications which survive in the Byzantine lands, in refining ideas of developments — especially of defensive techniques — and in understanding the defensive systems of the Empire as a whole in different periods. We hope, however, that by presenting a small selection of fortresses, with a large account of the problems they present, to have made the subject more accessible, and to have introduced material worthy of far more study.

Abbreviations

AJA	American Journal of Archaeology
ArchJ	Archaeological Journal
AS	Anatolian Studies
BCH	Bulletin de Correspondance Hellénique
BMGS	Byzantine and Modern Greek Studies
BNJ	Byzantinisch-neugriechische Jahrbücher
BSA	British School at Athens, Papers
BSR	British School of Archaeology at Rome, Papers
DOP	Dumbarton Oaks Papers
EHR	English Historical Review
GGA	Göttingische Gelehrte Anzeigen
GOTR	Greek Orthodox Theological Review
GRBS	Greek Roman and Byzantine Studies
IRAIK	Istanbul. Ruskii Archeologicheskii Institut. Izvestiia
IstMitt	Istanbul. Mitteilungen
JBAA	Journal of the British Archaeological Association
JDAI	Jahrbuch des deutschen archäologischen Instituts
JHS	Journal of Hellenic Studies
JOAI	Jahreshefte des Österreichischen archäologischen Instituts
JOB	Jahrbuch der Österreichischen Byzantinistik
JRS	Journal of Roman Studies
LKP	Die Landmauer von Konstantinopel
MUSJ	Mélanges de l'Université Saint-Joseph, Beyrouth
PalQuart	Palestine Quarterly
TAM	Tituli Asiae Minoris
TravMem	Travaux et Mémoires

PART ONE

CHAPTER 1: THE LEGACY OF THE ANCIENT WORLD

- 1 For place names the Anglicised version is used if one exists (though not the Churchillian preference for Angora in the place of Ankara). Where more than one name is given, the Greek or Latin version appears first and the modern name second. C and K are both used in the transliteration of Greek and Roman place names. Turkish names are used where they are likely to be more familiar.
- 2 For ancient Middle Eastern and Greek fortifications there is now the masterly survey of A.W. Lawrence (1979), also Winter (1971). When Byzantine fortifications are as well served by scholars as are Greek fortifications by these two books, the subject will then come within the sphere of knowledge as opposed to speculation.
- 3 Philo of Byzantium. The text of the *Poliorketika* in Garlan (1974). 291–327, and English translation in A.W. Lawrence (1979). There is an English translation of Philo's other work on war, the *Belopoiike*, in Marsden (1971). Although much remains to be done in the study of Byzantine military manuals, it is clear that there was an impressive continuity in the study of sources and in the writing of new works. In this respect see Dain (1967). There is much less evidence of continuity in the Latin West. Fedden and Thomson (1957) 40, quote Geoffrey Plantagenet, son of Fulk, King of Jerusalem, as handing a copy of Vegetius to an attendant monk in 1151. This happened in France at the siege of Montreuil Bellay, and not on Crusade. The words '*sicut invenis in lectione, ita usque in crastinum videbis exhibere in opere*' do suggest that a military gentleman thought it a good idea to read up on his subject, but if Vegetius was the best of ancient authors available to him, he could not have learned much about fortification, upon which Vegetius has only some brief generalities in Book IV. Schenk (1930) dates Vegetius to the end of the fourth century and suggests that he derived his information from a work of the 1st century A.D. by Sextus Julius Frontinus.

- 4 Lawrence (1979) 63-66, gives references to Roman accounts of sieges. Toy (1966) 264-267, for the Roman siege of Syracuse.
- 5 Tuulse (1958) 14-17, differentiates the Roman fortifications of the East and West, and his account of developments differs from mine.
- 6 Examples in Diehl (1896) 138-225; more recently, Pringle (1981).
- 7 Karaiskaj (1981) figs. 78, 79, 81 at Pamje, Vigut and Elbasan. In Asia Minor, there must be many examples yet to be recorded. Viranşehir east of Ankara was published by Jerphanion (1928) 220-222, and visited more recently by Restle (1975). There is an undated rectangular fort at Çorum, north-east of Ankara. Another important site whose dates are uncertain is Corycus, claimed below to have Byzantine walling. In Syria, there are rectangular sites at Sura on the Euphrates, and at Sergiopolis/Resafa: see below. In Pontus, there is perhaps a seventh century rectangular site at Sursurmaena: Bryer and Winfield (1985).
- 8 Creswell (1958) 82-84 (Minya), 111-123 (Kasr el-Heir), 124-134 (Mshatta); also Creswell (1952). Anjar lies to the north of the Beirut-Damascus road in the Bekaa Valley.
- 9 Erdmann (1961-76).
- 10 Johnson (1973) 215-217 (Soissons); Richmond (1931) 92 fig. 15 (Leon); Butler (1961) 25-50.
- 11 Toy (1953) 10, 11, 20. For Britain there is a helpful bibliography of fortification: Kenyon (1978), 1982.
- 12 Conant (1959) 21.
- 13 Beresford (1967) 142-152.
- 14 Bruce (1957). For the *Limes Germanicus* see Schonberger (1969).
- 15 Chapot (1907), Dussaud (1927), Poidebard (1934), Brünnow and Domaszewski (1904-5) I. 429-464 (fort at Odrum), vol. II (other rectangular forts); van Berchem (1954). The Romans were fortifying their frontier towns in Syria in the third century apparently not only against the Persians but against the Bedouin. It makes the seventh century eruption of Arab conquest more understandable when it is seen as the culmination of a continuing process rather than a sudden inexplicable phenomenon. For the towns see Pflaum (1952), Von Gerkan (1935). For the African frontier see Cagnat (1913) where both forts and ditches were used, and Pringle (1981); also Goodchild and Ward Perkins (1949); Goodchild (1950). The Anonymous, author of *De Rebus Bellicis*, ch. XX mentions castella on the frontiers, Hassall and Ireland (1979); and the passage is discussed in the same volume by Johnson, 67-75, with further bibliography on the subject. On the Byzantine side the Anonymous Byzantinus also describes the fort system, text and German translation in Köchly and Rustow (1855). Dain, (1967) 343, dates the Anonymous Byzantinus to the mid 6th century. For the continuation of the fort system and other frontier obstacles in rough mountain country in the Balkans there is the reference in Anna Comnena. IX, I, "At one place he commanded trenches to be dug, at another wooden towers to be erected; where the terrain permitted, small forts were to be built of brick or stone." It is interesting to compare this with what Cagnat (1913) says of the African frontier, and with the variety of Hellenistic frontier fortifications described by A.W. Lawrence (1979).
- 16 Cottrell (1964), Johnston (1976).
- 17 Jenkins and Megaw (1934) 68-89. Harrison (1969). I have had no time to chase publications of the Crimean wall. The Abkhasian Wall encloses a stretch of coast at the east end of the Black Sea from Sukhumi in the north to the mouth of the Phasis in the south. Its date is uncertain, but it is unlikely to be earlier than Byzantine since it is built of random coursed mortared rubble.
- 18 Schuchhardt (1901). The Long Wall was repaired in the reigns of Basil II and Constantine VIII in the late 10th or early 11th century. Jenkins and Megaw (1934) 69, note that Phrantzes describes a repair to the Isthmian Wall in 1415 by Manuel Paleologus.
- 19 Richmond (1930), Todd (1978) 78-83, discusses the Aurelian Wall and its relation to other 3rd century developments in fortification.
- 20 Von Petrikowitz (1971). This important survey is full of valuable observations for changes taking place in this period in the West.
- 21 Boethius and Ward Perkins, (1970) 524-529 and fig. 14. The ultimate development of separating a tower so that it stands out as an independent unit may be seen in the 15th century Welsh Marcher castle at Raglan. This is the Yellow Tower of Gwent. Brown (1970), pl. 75.
- 22 For Salonica there is still no good overall study of the walls. Tafrahi (1913) 13-114. Vickers (1969),

has studied some of the problems, also (1972), 156-170, (1970), pls. I with II. For Constantinople: *LKP*, and Part II below.

- 23 Armitage (1912) 63-79, The origin of private castles. Brown (1969) 12-13, sees a possible origin for the Norman Keep in the fortified palaces of late Carolingian France. Alcock (1978) illustrates the timber and drystone walling of the Arthurian fort at Cadbury, figs. 18, 19, and 223 points out that the builders had lost the art of mortared masonry. Salzman (1967) 1, quotes the story which William of Malmesbury got from Bede, that in A.D. 670 Benedict Biscop had to bring the first builders of stone edifices in England from abroad.
- 24 Von Petrikowitz (1971) 203, suggests the importance of fortified towns in transmitting knowledge of ideas about fortification.
- 25 Dain (1967) 373.

CHAPTER 2: JUSTINIANIC FORTIFICATION AND THE TOWER FORTRESS AND CITADEL

- 26 Diehl (1896), Pringle (1981).
- 27 The bent entrance was common in Greek fortification. A.W. Lawrence (1979) 302-342, points out the conflict between the convenient use of a gate and the need to fortify it. The Romans, in general, built straight gates with flanking towers, but from the 3rd century onwards when defence became more important, the bent entrance becomes more important.
- 28 Von Petrikowitz (1971) 200.
- 29 Procopius, *Buildings*, III, 13-65.
- 30 Procopius, *Buildings*, II, 8-25. Summary accounts in Mango (1976) 49-59.
- 31 Naumann (1971) fig. 124b. A.W. Lawrence (1979) 25-28. It may be remarked that as soon as ditches came into use, the surplus earth must have naturally suggested itself as a foundation for heightening a wall, or as a revetment, and hence the glacis, talus, or berm in rudimentary form.
- 32 Procopius, *Buildings*, II, v, 6-9.
- 33 Procopius, *Buildings*, II, ix, 3-9. Drawings of the walls on 104, 105. Mango (1976) 39, with plan, photographs, and bibliography, mainly concerned with the churches and not the walls.
- 34 *LKP*; cf. Part II below.
- 35 T.E. Lawrence (1936) 26.
- 36 Procopius, *Buildings*, II, i, 15-20. The reference to the structure of σφαιρικὸν σχῆμα which Justinian added appears to be the first reference to the central turret on top of a fortified tower. The translators have "At about the middle" for κατὰ τῆν but a permissible change might be "down upon" or more simply "upon", and I have emended the translation accordingly. The ruinous state of most fortifications means that these upper structures do not survive. The earliest known to the writer in Turkey are of the 14th and 15th centuries, but in the West 13th century examples survive at Harlech, Conway, and Caernarvon. For an account of Dara by a recent visitor, see Crow (1981). Crow points out discrepancies in Procopius' account, and few would deny that in his enthusiasm for eulogy Procopius attributes much to Justinian that was done more probably by his predecessors, but this does not invalidate the descriptions that he writes of what he saw or of what was described to him.
- 37 Toy (1966), 68. Toy follows Oman's (1924) general view, II, 17-19.
- 38 Toy (1966), 68-73. Oman (1924) II 17.
- 39 It may be that Philo of Byzantium, II, 48, is describing this type of powerful independent tower when he refers to πυργοβάσεις, and that this is the prototype of Procopius' πυργοκάστελλον mentioned as having been built at Constantina, *Buildings* II, v, 8-9. It is noteworthy that Procopius refers to these towers as something obviously well known. Otherwise he would have hastened to attribute their invention to Justinian. This agrees with the translation and interpretation of Philo's text by Garlan (1974) 297, and 361-2. It is, however, quite different from that of A.W. Lawrence (1979) 82, 392, who regards Philo's term as referring to open gorge towers. We agree in understanding that Philo is referring to separating the masonry of the wall from that of the tower. A.W. Lawrence, however refers to this as 'an extremely unlikely proposition', 84. He may be mistaken since the building of towers as units that are structurally separated from the curtain wall appears at least as early as the Roman period. Garlan (1974) 362, describes separation of towers as common in the Hellenistic

- period. The Saxon Shore fort of Burgh Castle is a western example, and see p. 31 fig. 73 Niksar.
- 40 Smail (1956) 226-229, has a brief consideration of Great Towers or Tower Keeps in Crusader Castles, and considers that T.E. Lawrence was right in his view that the Crusaders brought the idea of these towers with them, and did not learn of them from the Byzantines.
- 41 The word is given by Liddell and Scott as *πραιτώριον* meaning the official residence of a governor, and derived from the Latin. Sophocles' Byzantine Lexicon has a 6th century usage simply as a magnificent building. It is used in this sense to describe the Audience Chamber of Al Mundir at Resafa, and a rather grander building at Musmiye: Hill (1975). Neither of these are military barracks. Anna Comnena, XIII, iii uses the term for the Byzantine governor's residence at Dyrrachium, which was attacked by the Franks.
- 42 Sura was a legionary station, and situated in the flat Euphrates flood plain, hence its symmetrical form. Dussaud (1929) 275, and map XIV for the position of this and other sites mentioned. For plan of Dibsi Faraj, see fig. 38. Dibsi Faraj is now buried in the lake created by the Tabka dam. The rescue dig there will be published by R. Harper and Dumbarton Oaks. For preliminary report see Harper (1975), with drawings and photographs of the masonry of fortifications.
- 43 Dussaud (1927) map. XIV. The site is now flooded by the Tabka dam.
- 44 Rey (1871).
- 45 Schneider (1938). William of Tyre, Bk III, ch. 8, records on the south side of the town "A tower conspicuous beyond the rest for its massive height and construction". And in ch. 10, the successful undermining of it. Perhaps the same tower as in Anna Comnena, XI i. There is a hint of Crusader interest in Byzantine fortifications in William of Tyre's remark, Bk III, ch. 1, "Nicaea had a very large and warlike population and was so remarkably defended by thick walls and lofty towers of solid masonry that our men as they drew near marvelled at the massive construction of the fortifications." In the Caucasus, probably influenced by Byzantine example, there are tower fortresses at Largvisi and Ujarma, see Mepiaschwili and Zinzadze (1971) 51, 197.
- 46 Deschamps (1930); (1935) 73-88; on 74 he assumes that the Byzantine castle was constructed after the re-conquest of the area in 975 A.D.
- 47 William of Tyre, Bk XX, ch. 19.
- 48 Lloyd and Rice (1958) for plans and photographs. Seljuk fortifications appear to have received little investigation except in this work. Two criticisms of it would be that there are a thousand years of late Roman and Byzantine history before the first Seljuk inscriptions, and no fortification is attributed to this period although the Byzantine church in the citadel, perhaps of 12th century date, proves a presence. And second, that the Seljuks were notably fine builders in ashlar masonry whereas much of Alanya's walling conforms to the untidy Byzantine pattern. I would suggest that most of the Seljuk inscriptions in the walls of Alanya, Antalya, and Sinop are insertions commemorating the rebuilding of existing Byzantine walls rather than proof of new Seljuk walling. Seljuk and Ottoman architecture were only given due credit and notice by one scholar up to the Second World War: Gabriel, (1931 and 1934) and (1940). The walls of the Seljuk capital, Konya, have gone. The walls of Kayseri are attributed to them but they are conservative work which could pass for being 800 years earlier. A fine example of a fairly complete castle and town walls of the late 12th century are those of Bayburt in the north-east of Turkey (figs. 41, 42). The walls were slighted in 1829 by Prince Paskevič but are still most impressive.
- 49 Toy (1966), plan 232; plans and section of tower 87-89, pl. 86a. Toy attributed the original construction to Alexius Comnenus, but Rumeli Hisar is entirely the work of Mohammed the Conqueror. See: Gabriel (1943).
- 50 Fedden and Thomson (1957) 105-107, where Anamur is attributed to the Franks. Its late date is attested by the canon ports low in the walls, and it was almost certainly built by the Ottoman Turks as a part of their campaign to subdue the Karamanoğulları.
- 51 Kiel (1973). The tower was built by Sinan in 1536. I am indebted to Dr Vickers for this note.
- 52 Brown (1970) 14-39 prefers to see the emergence of private Norman fortification as an independent phenomenon arising from the development of Feudalism. While the connection of Feudalism with the appearance of the Norman castle is incontrovertible, it does not in any way follow that private forms of fortification are an innovation, or that methods of private fortification do not have their lineage in earlier traditions of public fortification. For another view of the Anglo-Norman Keep,

- which brings in a consideration of Saône see Renn (1960) and (1968).
- 53 Brown (1969) 12, puts the difference quite clearly: "They represent the different concepts and different purposes of different worlds, the one a communal fortification, the other the feudal castle of a feudal lord."
- 54 Oman (1924) 24.
- 55 T.E. Lawrence (1936) 52.
- 56 Davison (1969) King and Alcock (1969).
- 57 Creswell (1958) 165, fig. 31. Ecbatana was described by Herodotus, see Toy (1966) 260-261.
- 58 Claude (1969) 15-41 gives a general view of 6th century town walling, with useful bibliography.
- 59 T.E. Lawrence (1936) 25. My references to T.E. Lawrence on Byzantine fortification are necessarily critical because he had not looked at enough texts or monuments. The criticisms do not in any way detract from his powers of critical observation when confronted with a castle site, and for his practical deductions about it.
- 60 Brooks (1898), Ahrweiler, (1962). Foss (1975) has pointed out that the destruction of the great Antique cities had already begun with the Persian Wars of the late 6th and early 7th centuries. It is still by no means clear in detail how Asia Minor changed its social and economic life, but it is certain that by the time that the Crusaders marched through it, it was a land of fortified hill sites with market towns sheltering under them, and not of flourishing cities in the plains.

CHAPTER 3: BYZANTINE FORTIFICATIONS 650-1204

- 61 Procopius, *Buildings*, III, 13-15, on Bizana.
- 62 See note 60.
- 63 For the beacon system, see the comprehensive treatment of Passenden (1983), and for its geography, Ramsay (1890) 352f, 187, 20.
- 64 Neither Roman villa sites in the countryside nor their successor sites have been investigated in Asia Minor. A number of small castles are given in Bryer and Winfield, 1985.
- 65 Minorsky (1937) 157. See also Michael the Syrian, who has useful information on Arab attacks on fortifications.
- 66 Smail (1956) 217-223, discusses castles on the spurs of hills; "If the castles occupied or built by the Syrian Franks are considered as a whole, the predominant feature of the majority is not the embodiment of a sophisticated theory of fortification, but the re-inforcement of strength already provided by nature." This is of course true but the powerful final phrase is a perfect summary of all post-6th century Byzantine castle building, and it is the lack of mention of this Byzantine background that makes accounts of the Crusaders' architecture so lop-sided. Kastamonu castle, the ancestral home of the Commene family had a covered way down to the river. And Pharangion/Ispir, in north-eastern Turkey, is another example. Jerphanion (1928) 150 reports a tunnel at Ankara from the citadel to the ravine for sorties, but it may equally have been a means of access to water. In general the importance of water supply for the dry hill-top sites cannot be sufficiently stressed.
- 67 The argument as to whether Château Gaillard be regarded as the culmination of Norman fortification, or as the beginning of a new era in Western Mediaeval fortification does not concern the present point. In choice of site, it may be regarded as an innovation in the northern Europe of its time, but in its basic form of keep, inner bailey, and outer bailey, it stands in a long tradition.
- 68 Thompson (1959) Setton (1955).
- 69 Mansel (1963) cf. Foss (1977). A similar contraction occurred in the great North African harbour town of Lepcis Magna, see: Goodchild and Ward Perkins (1953).
- 70 Procopius, *Secret History*, XVIII, 42.
- 71 Procopius, *Buildings*, II, 22-24, attributes the building of one of these water tunnels to Justinian, at a fort called Baras in eastern Turkey. The indefatigable young Jesuit Father de Jerphanion (1928) 22-40, described a few examples. A.W. Lawrence (1979) 129, 439 n. 3 is wrong in suggesting that the tunnels are for rainwater collection. They are tunnels made to find a water source or spring, although rainwater might have been collected in them as a help to a spring. The most impressive rainwater collection arrangements known to the writer are the remains of a tilted area about the size

- of a football pitch at Monemvasia. This was given a smooth lime mortared surface, and cisterns were built at the lower end.
- 72 Quite a large number of Pontic castles will be published in Bryer and Winfield (1985).
- 73 The source for the Aplekta is in Constantine Porphyrogenitus *de Cerimoniis* 444-445. See Huxley (1975).
- 74 For comment on the geographical positions of Tokat and Amasya see: Winfield (1977).
- 75 Procopius, *Persian Wars*, I, 15.
- 76 For timber bonding see below p. 29, 38. fig. 93.
- 77 Philo of Byzantium, II, 62.
- 78 Bryer and Winfield (1985).
- 79 Procopius, *Buildings*, III, iv, 6-7.
- 80 C. Foss is at present working on a British Institute of Archaeology at Ankara survey of the history and site remains of the fortifications which will modify the few remarks made here.
- 81 Ramsay (1890) numerous references, particularly 87, 139; Eyice (1973).
- 82 These appear in the walls of Alanya, the Island castle of Aradus off the Syrian coast, and in a Byzantine or later section of the western curtain wall at Salonica. It has been suggested that at Conway they are decorative finials: Taylor (1976) 16, and Brown (1970) 103. This is highly unlikely in so geographically diverse a selection of military buildings, and there is a good practical reason for them. The size of a garrison was often a major tactical problem, and in an age with no telescopes or binoculars, when an enemy had to rest out of bow-shot, one man with a helmet on a stick could walk the curtain wall and create the impression of many men with the greatest ease. The trick being generally known, the uncertainty about size of garrison would still be important because of visual distance.
- 83 For Byzantine Seleucia see the evidence of Anna Comnena xi.x: transl. Dawes, 363. Ahrweiler (1966) 187; Fedden and Thomson (1957) 103-105, with plan; Hellenkemper (1969) 242-249; Müller-Wiener (1966) 79-80, pls. III-III. The classical remains and the Byzantine cistern were investigated by J. Keil, A. Wilhelm, *M.A.M.A.* III, 3-22, pls. 3-11.
- 84 Hellenkemper (1976) 249-254. The first thorough investigation of Corycus was by Herzfeld and Guyer, *M.A.M.A.*, II, 90-194, but their dating of the masonry needs modification since it largely ignores the Byzantine period.
- 85 Anna Comnena. XI.x; transl. Dawes, 363. Anna Comnena explicitly states that Corycus had in former times been a great city but that it was in ruins and the Emperor Alexius commanded the rebuilding of both Corycus and Seleucia and that garrisons be left in them to prevent Bohémond from taking them.
- 86 Ahrweiler (1966). 187.
- 87 *M.A.M.A.* II. Hellenkemper (1976) 161-168. 242-249, pls. 63-68.
- 88 See above, n. 84, 85.
- 89 Gough (1952) 85-150, cf. Dunbar and Beal (1964) and Youngs (1965) for Tumla, Gökvelioğlu, and Yılan. Robinson and Hughes (1969) 183-207. Hellenkemper (1976) mentions Anavarza, 191-201, and gives some Byzantine sources, 267-268. Boase (1978).
- 90 Fedden and Thomson (1957) 36, 37, 49, 50. On 36 they say 'The architect of Til Hamdoun clearly had Krac as his model.' In my view the reverse was very likely true. Müller-Wiener (1966) 75-77 pls. 106-108. Hellenkemper (1976) 140-153.
- 91 Strabo, XIV, 5, 19. Pliny *N.H.*, V, 91.
- 92 Anna Comnena XIII. xii, xiii. *XV III* allgemein: Μαύρος ὅπως καὶ πάλαι ἔατο
- 93 Youngs (1965) II7, pl. XIX B.
- 94 Gough (1952) 119-125, and pl. IX b.
- 95 Youngs (1965) pl. XXI A.

CHAPTER 4: BYZANTINE MASONRY AND CONSTRUCTION

- 96 There is not a great deal written on the technique of constructing walls as opposed to their exterior style of masonry. For the period up to the end of the Hittite Empire there is a lot of evidence in Naumann (1971) and many of the systems of wood re-inforcement appear in later times. It is a sad paradox

- that 'Dirt archaeologists' just because they deal with remains that have little or no external style left, pay much more attention to evidence dealing with techniques of construction than do scholars who deal with later works that are still standing and give evidence of their external style. Thus we know more about some aspects of prehistoric construction than we do of Antique or Mediaeval work. The use of wood in walls is a case in point; see below.
- 97 Winter (1971) 126-151, pl. 105, and 135 for foundations of casemate system. A.W. Lawrence (1979) 208-220.
- 98 Middleton (1890) Boëthius and Ward Perkins (1970) 245-263.
- 99 Rice (1958); Ward-Perkins' chapter on building methods introduces the term 'mortared rubble', 57, as opposed to 'Opus Caementicium' which is Roman concrete, and he defines the differences 78-83.
- 100 The best short account is Cowper (1927) also Davey (1961), and for a technical account Boynton (1966). The most informative accounts are those from the 19th century before lime was superseded by Portland Cement, see Vicat (1837), Burnell (1856).
- 101 Pliny, *N.H.* XXXVI, 52-55. Vitruvius II, 6.
- 102 Vitruvius II, 6.
- 103 Cowper (1927) 4-5, but without giving source.
- 104 Salzman (1967) 154.
- 105 Cowper (1927), Burnell (1856), Vicat (1837).
- 106 My own observations have shown great variations in the strength of lime mortar in the buildings of Asia Minor, and sometimes in different parts of the same fortification which were built at the same time. Such variations are the result of different mixes of mortar but the general quality of lime mortars continues to be good in the Byzantine period even though the use of random coursed stone facing may make a structure appear crude. Among variations in Britain, the mortar of Conway varies between good hard quality and a fairly crumbly mixture with too much sand in it. The master mason who built or re-built the trio of Hubert de Burgh's border castles, Skenfrith, White Castle, and Gros-mont, either knew not or cared not greatly about the quality of his mortar. By contrast the grey mortar of the Norman keep at Clun in Shropshire is among the hardest of mortars.
- 107 Deichmann (1956) has a study of the use of banded brick and stone construction. Also Schneider (1936) 13-14, remarks on developments in the Byzantine period with more brick and less stone.
- 108 Vitruvius, II, ch. VIII, 1-5.
- 109 Theophrastus, chs. 64-69.
- 110 Philo of Byzantium I, 8, 11, 20. A.W. Lawrence (1979) however, translates γύψος here as plaster, and comments on 73, that it may cover lime as well as plaster of Paris. On p. 209 he notes the very limited use of plaster recommended by Philo, and his lack of emphasis on it certainly suggests that its binding strength was not then fully understood.
- 111 Sir Henry Wotton was paraphrasing Vitruvius I, II.
- 112 See note 23, above.
- 113 The lime acts as a shelter coat to prevent rainwater soaking into the wall and disrupting stonework. This was clearly well known to Byzantine and Western Mediaeval builders and it is still used on the Continent and in the Mediterranean World. The use of a shelter coat only fell into disuse in England in the 19th century when a love of romantic decay and natural stonework came to the fore, causing the spate of modern problems of stone decay.
- 114 The castles of Orford, Goodrich, and Castle Rising in England, Falaise in Normandy, and there must be many more.
- 115 Philo of Byzantium I, 13. The comment of A.W. Lawrence (1979) 220 is denigrating about the usefulness of wood. There is an odd contrast between the succession of Ancient writers who constantly recommend wooden ties and the succession of modern Classical scholars who constantly ignore what the texts say and what evidence is provided in ancient and mediaeval walls; the scholars are admiring the long term survival of beautiful masonry in the form of romantic ruins whereas Ancient writers were concerned not with our impressions of their skill in masonry, but with the impeding of enemy assaults on walls, for which cribwork was an efficient, practical, and widely used aid.
- 116 Vitruvius, I, V, 3.
- 117 Caesar, *Gallie Wars*, VII, 23.
- 118 Todd (1978) pls. 13, 14, 18, 25.

- 119 Personal observation; *LKP* II 23, suggest only in the middle Byzantine and Paleologan masonry. In the Great Palace of Constantinople timber bonding appears early according to the authors of the first report: Brett, Macaulay and Stevenson (1947) 3 and pl. I, 4. The stone type of masonry is described as a mortared rubble core with coursed stone facing and an internal horizontal framework of beams placed at vertical intervals of 2.5m. Ward Perkins in Rice (1958) 62, refutes this evidence, giving no reason, and says that it is Turkish work. His argument seems to lie in a refusal to believe in timber re-inforcement, of which he says "On the whole it seems unlikely to have been used extensively since it was essentially a method of stabilizing foundations in loose earth."
- 120 Boethius and Ward Perkins (1970) pls. 191, 264, 265, 267, 275. Other 4th and 5th century examples can be seen at Philippi, see Lemerle (1945) fig. 55, but these are described by Lemerle as scaffold holes although on 490, he affirms that they go through the walls. Krautheimer (1975) photographs of Ravenna, Baptistery of the Orthodox, and S. Giovanni Evangelista, show beam holes in brick buildings. An early scholar of Byzantine building methods found no difficulty in accepting and understanding the role of timber reinforcement: Choisy (1883) 115-117 and fig. 113a, illustrates an example of cribwork from Constantinople. Textual evidence for wooden ties in the 10th century comes in Leo the Wise, constitution XV, para. 69.
- 121 There are examples of brick bonding from Syria in the east, at Kasr Ibn Vardan, 6th century, to Britain in the west, Burgh Castle 4th century, and the walls of Colchester. In Turkey an example of how much Byzantine material can still be found, even by someone not looking for it, can be seen in Haspels (1971).
- 122 The statement that timber bonding is common in Turkey, Greece and the Balkans rests on personal observation. For Turkish Byzantine castles there is no publication other than the very general survey of Sevgen (1959). Greek mediaeval castles have been treated as entirely Frankish works. On the historical grounds that the Byzantines must have lived somewhere in the 400 years or so between the reclamation of Greece from the Slav invasions, and the coming of the Franks, there is a strong pre-supposition that many of the castles should date from the Byzantine period. And visits to the castles and the reading of accounts of them suggest that many of them have Byzantine work in them. Many of them show evidence of timber lacing in the walls although this is not described as such in published accounts. Bon (1937), 136-208, (1969); Andrews (1953) is cautious as to dating but still attributes much too little to the Byzantine period. For Balkan castles, Deroko (1950) 82-83, correctly describes the use of timber in walls.
- 123 Dunbar and Beal (1964) 177, 181, 182, where the timber work is correctly referred to as tie beams.
- 124 The cribwork system is illustrated in fig. 93, and the chases for timber can be observed wherever collapse exposes a cross section of walling.
- 125 *I Kings*, vi, 36, "Three rows of hewn stone and a row of cedar beams" quoted in Thomson (1960).
- 126 Naumann (1971), 86-108, particularly at Boğazköy, figs. 90, and 92, showing what appears to be a prototype cribwork system. For Gaul, Caesar, *Gallic Wars*, VII, 23.
- 127 Timber bonding may have continued in sophisticated Roman concrete building because apart from its re-enforcing function, analogous to the use of steel in modern concrete, timber would have been invaluable in containing and shaping large masses of slow setting lime mortar. The authority on Roman work, Blake (1947), quotes Vitruvius, and refers on 187-188, to the use of wooden clamps in the Basilica Aemilia and Julia but seems doubtful of tie beams, although adding reluctantly p. 344 "Tie beams were occasionally used to hold stone facing together" and p. 349 on Augustan concrete. "The beams were not unknown and occasionally headers were long enough to penetrate into the core of massive structures." Blake (1959) has further references.
- 128 Wilcox (1972) and (1981) describes what appears to be cribwork systems without clearly recognising them as such. Binding (1977), is clearer about the permanent use of timber as re-inforcement within the masonry of a wall, but does not have cribwork.
- 129 The keep at Chepstow castle has brick courses as bands in the facing of the wall, giving a Roman or Byzantine appearance, but the bricks are on the face and perform no function. The same is true of the bands of different coloured limestone and sandstone at Caernarvon castle.
- 130 Some curious examples of late Byzantine vertical pilaster strips appear in the towers of the monastic fortifications of Hilandar on Mount Athos and Rila in Bulgaria. These need further investigation, and a western origin has been suggested for them: Čurčić (1981).

- 131 Illustrations in Richmond (1930), or Todd (1978).
- 132 *LKP* II, pls. 6-8 and other illustrations in Vol. 1.
- 133 Anakopi stands on a hill north of Sukhumi at a point where the mountains come down to the sea. It is a massive fortress effectively blocking the way of any invader trying to march south to the fertile lands of Colchis and Lazica. Plan and account of excavation of it in Trapsh (1975).
- 134 King (1977), remarks that the keep is a very French structure by English standards, with a prototype in the round domed keep of Châteaudun, but he points out that the builder of Pembroke, William Marshall, spent two years on Crusade as a knight attached to the Templars. There are less impressive saucer domes in towers at Kidwelly and Caerphilly.
- 135 Unless A.W. Lawrence's interpretation of Philo of Byzantium's Palace Towers is correct, (1979) 84, 85, 221.
- 136 Deroko (1950) plan, 142-143. All the towers of the landward walls are open gorge. At the slightly earlier monastery of Resava, all the towers except the Despot's Tower are open gorge. The Despot's Tower is a good example of a tower fortress or keep.
- 137 For example at Conway and Caernarvon.
- 138 A.W. Lawrence (1979) Philo of Byzantium, I, 44; fig. 77 for Isaura. Winter (1971) 246.
- 139 Von Petrikowitz (1971) 183.
- 140 Megaw (1977).
- 141 Jerphanion (1928) 155-166 pointed to Philo as the origin for this type.
- 142 Vickers (1970) 278, pl. 2 and figs. 4, 4a.
- 143 The castles of Greece have been subject to the same kind of attitude as that taken to castles in the Holy Land, and it is surprising that normally nationalist Greek scholars have not challenged this view. (See n. 122 above.) For an example of the dismissal of Byzantine evidence, see Bon (1969), for Mistra 639-642 and pls. 141-146. The chapel in the citadel was tentatively claimed by a Greek scholar as having Byzantine paintings of the 13th century but this is brusquely dismissed by Bon, 641. The Chronicle of the Morea is taken as clear evidence that Villehardouin founded rather than re-occupied the town.
- 144 Karaiskaj (1981) 126, fig. 93. Deroko (1950) 167, 169, fig. 174 for Zvečan; Ribnica: 184, 186, fig. 197; also at Ohrid: 195, fig. 205. Mijović and Kovačević (1975) 61, row at Berat, fig. 59; Ribnica, 128-131; Text, fig. 104 for Cetatea Alba. Anghel (1975) 21-34, fig. 8, on 29.
- 145 Rey (1883) 134.
- 146 Ebhardt, (1958) ch. 1, Spanish Castles, fig. 23e, Cifuentes; fig. 27, Molina de Aragon; fig. 39, Alhambra, Granada; fig. 70, Coria in Estremadura has a prow shaped keep. Lamperez Romea, I. 264-266 for the only clearly shaped prow at Valladolid, Castillo de Simancas, pls. 274-275.
- 147 Viollet le Duc (1907) 121-132, states that the pointed bastion or horn dates from the 13th century, but see Ebhardt (1958) n. 154 for 12th century examples. For illustrations and general accounts see: Enaud (1958); Ritter (1953).
- 148 Toy (1966), 134-135. Ebhardt (1939) 27, 12th century at Chinon; 45, 359, fig. 42, Pfalzgrafenstein; 116, 119, figs. 125, 126, Tecklenburg; and other later examples going up to 17th century.
- 149 Ebhardt (1958) 241, fig. 267; Prato, 244-245, pl. 59; 290, fig. 328, elevation; and 321, fig. 370, plan of Lucera, the south west side, with a magnificent series of 7 prow towers. See fig. 100 above.
- 150 Hassall and Ireland (1979). It is the only form of tower recommended by the *Anonymous Byzantinus* whose work dates from the 6th century. For a descriptive diagram see Rochas d'Aiglun, (1872) 156.

CHAPTER 5: THE USE OF THE SOURCES

- 151 Note 3 above.
- 152 Note 15, above, *De Rebus Bellicis*, XX.

CHAPTER 6: THE BYZANTINE LEGACY AND THE FRANKISH USE OF IT

- 153 It would be useful to have a list of masonry fortifications in Western Europe that antedate the First Crusade and to see what elements of fortification were peculiar to Western Europe, or common to

both West and East. In respect of timber and the origin of the castle in England a start has been made with the five castle excavations, (Saunders, 1978), and it is to be hoped that the scope of such investigations will become broader both in England and on the Continent.

- 154 Note 66 above. There are a great many castles in Turkey still waiting to be noticed on a map, let alone given a proper description and attribution. The British Institute of Archaeology at Ankara are making a beginning in this work with C. Foss at Kütahya.
- 155 For Saône the chronicler, Matthew of Edessa 22, writing at the time of its recapture by the Byzantines refers to it as a town, whereas elsewhere he speaks of fortresses as fortresses. Likewise the Arab Chronicler, Yahya, referred to it as a city, quoted in Schlumberger (1896) 289, 299. See also note 46 above. This historical evidence throws open the question of whether the Byzantine parts of the castle may not be 10th century but much earlier and perhaps 6th century or early 7th century, a date at which the *opus reticulatum* walling would not seem so improbable. Or the Byzantine parts could be Arab work. The latter would seem unlikely since an indubitably Byzantine chapel has recently been excavated just beside the south wall of the citadel.

PART TWO

CHAPTER 1: CONSTANTINOPLE

- 1 LKP II. 2f., 16-18, with convincing evidence to refute the long-accepted notion that the inner wall was a later addition.
- 2 For this and the following, see LKP II. 4-10 and van Millingen (1899) 95-108. No further reference will be made to Tsangadas (1980) whose descriptive sections are copied almost *verbatim* from van Millingen in a shameless plagiarism which seems to have escaped the learned advisers named in the introduction.
- 3 These repairs are attested by a series of inscriptions with letters of brick; for their dating, see Foss (1984) 81-83.
- 4 For the attribution of inscriptions naming Basil and Romanus, see Foss (1984) 78-81.
- 5 For the following, see LKP II. 16-22, 26-37, and van Millingen (1899) 40-58. The best and most direct impression of the walls is given not by these detailed descriptions but by the magnificent restored drawings in LKP I, pls. 1-23.
- 6 Ditch: LKP II, 19f., 36f.
- 7 Outer wall: LKP I, *passim*, especially plates 1-5; II. 19, 33-36; van Millingen (1899) 53-55.
- 8 For the artillery, see below, on the inner wall. I shall maintain throughout a distinction between embrasures - wide openings of 60 cm. or more with varying heights - and loopholes, tall and narrow openings, usually not more than 20 cm. wide. The former term is preferable to 'window' which is sometimes used, since this should define an opening whose primary function is to admit light or air. 'Embrasure' has several senses: I shall use it only in this, to denote a large defensive opening in a wall or tower. For its various meanings, see *Dictionnaire militaire* (1898), s.v.
- 9 LKP II. 34, cf. pl. 34. The style of the blocking, with its relatively careful use of brick and stone may suggest that the change took place at an early date.
- 10 This was the normal disposition of ancient and Byzantine posterns: see Philo of Byzantium I. 33 in Lawrence (1979) 81, and Maurice, *Strategicon* X. 3, reproduced *verbatim* in *Tactica Leonis* XV. 53.
- 11 LKP II. 34f. In general, the gates of Constantinople will not be discussed here, since they have been treated in such admirable detail in LKP 37-71.
- 12 LKP II. 18 from *Chronicon Paschale* 719, describing the siege of 626.
- 13 Van Millingen (1899) 51-53; LKP II. 26-33.
- 14 Terminology of the artillery is often confusing and inconsistent. I shall make constant use of ballista to denote an arrow-shooting machine, and catapult for one which hurled stones. For the ballista, see the excellent and practical studies of Marsden (1969) 188-198 and (1971) 234-245, with analyses of texts; see also the detailed reconstructions of Payne-Gallwey (1903) 300-307.
- 15 Alternatively, a large machine could have been assembled in the room, and swung around to cover the various embrasures. This, however, in spite of the longer range, would provide less firepower.

- 16 On the importance of embrasures, see Marsden (1969) 128f. The point seems to have escaped Krischen (LKP I) who in plate 9 shows soldiers armed with crossbows defending the chambers of an octagonal tower by standing in and leaning through its embrasures. A soldier in such a position, of course, would be fatally exposed to enemy fire, and it is ironically significant that the same illustration shows one of the men lying dead on the floor. The embrasures were in fact intended for artillery, a subject curiously neglected by writers on these walls.
- 17 For catapults, see Marsden (1971) 249-265; Payne-Gallwey (1903) 249-299; and LKP II. 18f (texts showing that they were installed on towers).
- 18 See above, n. 11.
- 19 I have reached this hypothetical figure by presuming that each of the 2500 or more casemates would have been manned, and that a similar number of troops would have stood on the battlements of both inner and outer walls; that each tower of the outer wall would have three men in the chamber and two on the platform, and that corresponding figures for the inner wall would have been five and four. These estimates are probably a minimum.
- 20 See Dagron (1974) 112f., Cameron (1978) 104-125.
- 21 Pears (1903) 246ff.
- 22 Two sections of the pre-Theodosian wall which were discovered behind the walls of Manuel Comnenus have been discussed. The first, preserved for about 35 metres adjacent to the northern part of the Tekfur Saray wall, is quite distinctive. It has two levels of chambers, the lower open to the city and the upper with one embrasured loophole each. The vaulted passage from which the loopholes opened contained a series of arches to support the wall walk. This system more resembles that of the towers than the curtain of the Theodosian wall. The other section, in the district called Mumhane to the north, has lost most of its facing. Enough of the structure survives, however, to show that it had both square towers and large solid semicircular projections like bastions, apparently designed to strengthen the wall. On these two sections, see LKP II. 105-109.
- 23 Except for late repairs, the walls here discussed are constructed with a facing of layers of cut stone and bands of brick, but the variety of masonry is so complex that consideration of it will be left for the following section.
- 24 For these walls and their date, see LKP II. 106-108.
- 25 For the dating, see LKP II. 106, Foss (1982) 171-181, and below, 56-58.
- 26 See, above all, Payne-Gallwey (1903) *passim*; Anna Comnena X. viii. The Byzantines may have had a sort of crossbow much earlier: see Haldon (1971), but cf. *idem* (1975) 23, where the theory seems to be cast into doubt. In any case, the narrative and tone of Anna Comnena show clearly that the crossbow was a novelty in her time.
- 27 For the trebuchet, see Payne-Gallwey (1903) 309-315 and Oman (1924) II. 43-46; cf. White (1962) 102f. The history of the transmission of the trebuchet is not at all clear, and it could as well have spread from Byzantium to the West as *vice versa*.
- 28 LKP II. 114-117.
- 29 The most detailed description of the complicated building phases of this tower which is now inaccessible is given by van Millingen (1899) 131-151; cf. LKP II. 116f.
- 30 Tower B13 which bears an inscription of Isaac Angelus (on which see Foss [1982], 174-181 and [1984] 85f.) was probably part of the same residential complex, for it had on its north side at the level of the upper chamber a large vaulted opening suitable for a door or window and quite inappropriate for defence. This opening has now disappeared but is visible in the photograph of LKP II pl. 56.
- 31 LKP II. 118-121.
- 32 LKP II. 119 writes of a church, but the shape and orientation of the ruins seems rather to suggest a secular building.
- 33 Inner wall: LKP II. 29, 71-81 *passim*, pl. 6; outer wall: *ibid.*, 33, 35, 84-92 *passim*.
- 34 LKP II. 106 ff.
- 35 LKP II. 109-114 *passim*. The rebuildings are clear in almost every part of this wall because of the different masonry employed. Since this masonry seems not to block any earlier crenellations, it is not possible to state with certainty that the wall was raised. If this were not the case, however, the upper parts must have been extremely delapidated when the repairs were made. Pierced merlons: LKP II. 109, pl. 25.

- 36 *Ibid.*, 117.
 37 *Ibid.*, 120.
 38 *Ibid.*, 41.
 39 *Ibid.*, pl. 44, 47; the wall is not discussed in the text.
 40 Machicolations: Toy (1955) 120, 197f; palace: Krautheimer (1979) 473-475.
 41 Turkish bow: Payne-Gallwey (1903) 27-30, appendix 3-23; merlons: Toy (1955) 196.
 42 Loopholes: *LKP* I. pl. 34; II. pl. 25, 35 f; weapons of defenders: Pears (1903) 250 ff.
 43 On these techniques, see, e.g. Folk and Valastro (1975) for mortar analysis, and Kuniholm and Striker (1977) for dendrochronology.
 44 The discussion of dated masonry which follows draws freely upon *LKP* II, but makes extensive use of personal inspection of the remains. Several inscriptions are dated according to Foss (1984).
 45 In each case, a code letter has been assigned to a type of masonry; these are tabulated in Table I.
 46 See above, 45.
 47 *LKP* II. 23f, 118; for the individual sections of fifth-century work see the descriptions of towers 16, 17, 33, 34, 58, 62, 69, 70, 74, 90, 91 and 95 on 71-81. Inspection of these towers raises doubts about the identification of the earliest work, since some of them seem to vary considerably from the assumed criteria. The whole land wall plainly deserves a new and detailed analysis.
 48 *LKP* II. 24. This wall, the most vulnerable part of the fortifications, has undergone so much battering and rebuilding that it seems difficult to say with certainty that any part of it is the original Theodosian masonry.
 49 *LKP* II. 73; I. pl. 26.
 50 The rebuilding of the outer wall by Justin II mentioned in inscription no. 34 on the Mevlevihane Gate has not been identified.
 51 For Artemius, see Foss (1969) 66 n. 10.
 52 *LKP* II. 24; I. pl. 39.
 53 For the attribution, see Foss (1984) 81-83.
 54 *LKP* II. 131 no. 29b. The tower is illustrated in *LKP* I. pl. 25; the right section, containing the inscription, has now collapsed.
 55 The attribution is discussed in Foss (1984) 83; the tower is illustrated in *LKP* I. pl. 25.
 56 See Foss (1984) 81-83; illustrations: T47: *LKP* I. pl. 33; T55: *ibid.* (partial, from behind); T56: *LKP* I. pl. 3 (restored drawing).
 57 Detailed analysis: *LKP* II. 119; plan with building periods: *ibid.*, pl. 41; view: *ibid.*, pl. 59b.
 58 *LKP* II. 141 no. 64; see *ibid.* 119 for this in relation to the wall of Leo V.
 59 For similar stones in the almost contemporary walls of Ankara, see below, 143f.
 60 *LKP* II. 119-121.
 61 *LKP* II. 141 no. 62, with the name of Theophilus restored. Paspates (1877) 37 read the name of Michael, an equally likely builder. A fragmentary marble inscription with the name of Theophilus still visible built into the northern part of tower B14 could well have come from one of these towers. If so, it would confirm the attribution to Theophilus: see van Millingen (1899) 149. Another fragment in marble with raised letters reading αὐτοῦ καὶ ὁρῶν or [-ορος] is reused in the upper part of B17 and suggests that it, too, bore an inscription.
 62 Wall identified and illustrated in Foss (1982) 179f; cf. *LKP* II. pl. 18a; inscription: *ibid.*, no. 81.
 63 Date: Foss (1984) 78f.; illustration: *LKP* II. pl. 25 (view from c.1870).
 64 Grierson (1973) 530, 547.
 65 Foss (1969) 65; cf. (1984) 84.
 66 *LKP* II. 127 no. 15; cf. Foss (1984) 85; tower illustrated: *LKP* II. pl. 23b.
 67 Date: Foss (1984) 80ff.; illustration: *LKP* II. pl. 22 (from distance).
 68 Date: Foss (1984) 81.
 69 On what follows, see *LKP* II. 100f, and the detailed description of individual towers and walls, 109-114. For analysis of the styles and discussion of the chronology, see Foss (1982) 171-181.
 70 See the excellent view of a tower chamber and of the inner face in *LKP* II. pl. 53; cf. Foss (1982) 173 fig. 16.
 71 For these towers, see van Millingen (1899) 131-153; *LKP* II. 114-117; Foss (1982) 174-181; Foss (1984) 85f.

- 72 According to Paspates (1877) 39, the repairs to this tower, which are in a roughly arranged undecorated stonework, are of the nineteenth century. It is hard to understand, however, why such a large project to rebuild a ruined and long disused tower should have been undertaken at that time.
 73 For the window of B13, in a wall which has now collapsed, see *LKP* II. pl. 56.
 74 *LKP* II. 137 no. 48; see also Foss (1982) 179f.
 75 On this, see Foss (1982) 176f., with reference to the basic work of Aran (1979).
 76 They are on towers (2a), 12a, 27a, (37a), (41a), and (77a); those in parentheses have vanished.
 77 A fragmentary inscription, *LKP* II. 138 no. 48b, bearing the date 1334 was supposedly found at the Gate of Adrianople. If the provenance is correct, it may be associated with masonry which appears in the vicinity of the gate (itself a modern rebuilding) and which differs from those already assigned to the ninth and twelfth centuries. This stonework, however, is virtually identical to that of the fifteenth century; either, therefore, the attribution is incorrect, or the same style was used for a century or more.
 78 *LKP* II. 64.
 79 The remarks which follow are complementary to the detailed discussion of *LKP* II. 71-83, and concentrate on material which was omitted or only summarily presented there.
 80 *LKP* II. 75; I. pl. 27.
 81 Diagonal pointing occurs in late (undated) repairs to T26 (*LKP* II. 75), in T96 (p. 81), in the walls of the Blachernae (p. 25), in the Comnenian substructions (p. 116), and in the northern addition to tower B14 (p. 117).
 82 Dated in *LKP* II. 70.
 83 *LKP* II. 26.
 84 *LKP* II. pl. 47.
 85 For the date of the palace, see Mango (1976) 275.
 86 *LKP* II. pl. 56.
 87 In *LKP* II. 25, pl. 21a this wall is called Palaeologan, but cf. Aran (1979) 226 n. 86, who dates it to the late twelfth century by its masonry technique.
 88 *LKP* II. 114-116, with the excellent illustration, pl. 58; the wall is no longer accessible.
 89 *LKP* II. pl. 59.
 90 *Ibid.*, pl. 62.
 91 *LKP* II. 102, 118.
 92 Note here, as in all similar cases, that identity of style does not ensure chronological precision, but only creates a probability; in all cases, the dates given are deductions, necessarily approximate, from the evidence. Any of the walls in question could have been built a decade or more before or after the dates proposed.
 93 For other kinds of cloisonné, see types M1 and M2 below.
 94 Aran (1979) 226 n. 86.
 95 See previous note.
 96 The number of types could easily be multiplied. I have tried, however, to group similar types together, with the thought that practice might have varied considerably in a period, and in the hope of avoiding unnecessary complications.
 97 For the walls of the Golden Horn, see van Millingen (1899) 178-246, Dirimtekin (1950), Schneider (1950) and Müller-Wiener (1977) 308-311 with further references.
 98 The towers are numbered according to Dirimtekin (1953), the most detailed work available; the system is followed by Müller-Wiener (1977) 312-319, with excellent but incomplete maps and further references. The most comprehensive study of a short section of these walls appears in Demangel and Mamboury (1939). For their history, see van Millingen (1899) 178-193.
 99 Van Millingen (1899) 183; Demangel and Mamboury (1939) 11, 14.
 100 This tower is studied in detail by Demangel and Mamboury (1939) 71-73, with plans.
 101 Van Millingen (1899) 187.
 102 Demangel and Mamboury (1939) 49-55, with illustrations and detailed plans.
 103 Demangel and Mamboury (1939) 53f attribute this tower to the Isaurian emperors, even though they write in 53 n.8 that the tower has all the characteristics of constructions of Theophilus, and fragmentary inscriptions with his name have been found built into later adjacent walls.

- 104 Müller-Wiener (1977) 109, with references.
105 *Ibid.*, 126-131.

CHAPTER 2: NICAIA

- 1 Schneider (1938) 1f. The history which follows, unless otherwise noted, has been abstracted from the work of Schneider and that of Sölch (1939), both of which should be consulted for the general history of the city.
- 2 Zonaras I. 35; for the date, see Magie (1950) 1566, with references.
- 3 Although the small flan of the coin allows little scope for detail, it is evident that the actual walls are figured: note particularly the arches above the gate which correspond to the remains, as juxtaposed in the illustrations of Foss and Magdalino (1977) 65. Whether this means that the walls, or main gates, were completed during the reign of Gallienus, in spite of the evidence of the inscriptions of Claudius Gothicus, or whether the die-engraver was working from drawings, cannot be determined.
- 4 For this date, see Raby (1976) 186, from Covell.
- 5 Schneider (1938) 6 n. 4, although he quoted the text, curiously misattributed the rebuildings to Theodore I Lascaris.
- 6 The history of Ottoman Nicaea is the subject of an excellent and concise survey in Raby (1976) 166-176.
- 7 The following, unless otherwise noted, is based directly on the admirable survey of Schneider (1938) 9-19, which should be consulted for its details and drawings.
- 8 Theophanes 406.
- 9 For the dates of these, see below, 100f.
- 10 For what follows, see Covell 155ff., and Raby (1976) 179f.
- 11 Schneider (1938) 40.
- 12 Vocotopulos 1979.
- 13 Schneider (1938) 5, 41f., with references; cf. Raby (1976) 179.
- 14 Foss (1982) 197.
- 15 Traces of this superstructure are visible in Schneider (1938) pl. 48; cf. p. 35.
- 16 Aran (1979) 226f.
- 17 I owe this suggestion to professor Ihor Ševčenko. For the journey of Andronicus, see Ševčenko (1962) 137, 139; cf. Laiou (1972) 78f.
- 18 Buchwald (1977), (1979). Similar decoration appears in Palaeologan churches at Constantinople where, however, it is often more regular and elaborate: see for example, the church of Constantine Lips (illustrated in Müller-Wiener [1977] 126-131) and note the remarks of Yenişehirlioğlu (1982) 329 and fig. 1 on one of the motifs which appears here. In general, the styles of churches and walls, is so different that direct comparison is rarely possible. In the Palaeologan period, the walls, when elaborate, tend to use a complex alternating brick rather than a variety of decoration: see above, 103f, 109.

PART THREE

CHAPTER 1: TECHNIQUE, STYLE AND DEVELOPMENT

- 1 Material from Constantinople and Nicaea will appear here only for purposes of comparison.
- 2 For details, see the well-documented summary of Magie (1950) 705-715.
- 3 See the well-known series of epigrams in *Didyma* II no. 159 for this miracle.
- 4 For what follows, see *Milet* II. 3. 80-87, 36f., 114f., 127.
- 5 Such was not always the case: when the Goths attacked Side in Pamphylia, they used siege equipment and even constructed a tower as high as the walls: see Dexippus, *fr.* 23 in *FHG* III. 681.
- 6 Described in *Pergamon* I. 2. 229-304.
- 7 These walls are presented in detail by van Zanten *et al.* (1975); cf. Foss (1976) 3, 46.

- 8 Foss (1976) 1-13; the revolt of the Ostrogoths under Tribigild in 399, although it threatened Sardis, was a sudden event which passed so quickly that it is unlikely to have provoked extensive fortification.
- 9 It is mentioned by an inscription which records the gate being cut through when the street was constructed: Foss (1976) 115 no. 18; 44f.
- 10 The walls have never been published; see the brief analysis in van Zanten *et al.* (1975) 41f.
- 11 Note that three fortifications attributed to this period have been omitted from the present discussion. At Didyma, the temple of Apollo was blocked up and used as a fortress at the time of the Gothic attacks; it had no substantial walls of this period and is therefore not comparable with the rest: see Müller-Wiener (1961) 38-42. The walls of Dorylaeum and Prusias ad Hypium were assigned to this period by Körte (1897) 391-397; although virtually nothing is left of them, his description alone shows that they were far more probably of the Dark Ages.
- 12 See the summary of W. Ruge in *RE* s.v. Nikomedeia (1936).
- 13 Zosimus I. 35.
- 14 For the date of the walls, see Aurelius Victor, *Liber de Caesaribus* 39.45, and for their description, Pogodin and Wulff (1897) 154-160 and Firatlı (1959) 16-18, both with plans. They have now been surveyed by the British Institute of Archaeology, and will shortly be published with detailed descriptions and plans.
- 15 The walls of Aphrodisias, which include the whole city area and are faced with fine marble spoils in a decorative pattern, are supposedly dated to the mid-fourth century. Since they are now under study, they will not be treated here.
- 16 The walls are dated by an inscription, *RICA* 65; for their present remains, see Müller-Wiener (1962) 62 n. 11, and for the earlier, van Egmont (1759) 79.
- 17 Nineteenth-century plans of Smyrna, reproduced in Müller-Wiener (1962) show the line of the city walls, but naturally do not distinguish those of different periods; it is therefore not possible to determine the shape or frequency of the towers.
- 18 See Schuchhardt (1901), Dirimtekin (1948) and Harrison (1969).
- 19 For these events, see Foss (1975a).
- 20 Foss (1976) 57-59; cf. (1975b).
- 21 Gateway fully discussed with detailed plans: Müller-Wiener (1961) 91-97. The lower part of the present gateway clearly belongs with the square towers whose later shell only begins at the level of the springing of the entrance arch: see Müller-Wiener (1961) pl. 22.1 and Foss (1979) 114, fig. 36.
- 22 For the dating, see Foss (1979) 107 and Müller-Wiener (1961) 92 n. 165 for the spoils.
- 23 For the history of Ephesus in this period, and the administrative changes, see Foss (1979) 103-115, 195f. The wall of the inner citadel, which presents problems of dating, will be treated below, 138.
- 24 See Müller-Wiener (1961) 86-88 with references; cf. Foss (1979) 111f.
- 25 See Foss (1977a) 480, with references.
- 26 Jerphanion (1928) 212f.; Foss (1977) 74f.
- 27 The following is based on the meticulous description of Jerphanion (1928) where plans, illustrations and full details will be found; it may be used in conjunction with the description and analysis of Mamboury (1934) 144-188.
- 28 The spoils cover the walls to a height of twelve metres; the superstructure, later rebuilt, will be considered below.
- 29 See Foss (1977) 73.
- 30 See Foss (1979) 107ff., 195f.
- 31 Among these are numerous fortresses of Mysia and Lydia which I hope to discuss elsewhere in the context of the history and geography of these regions, as well as the walls of Nysa on the Maeander, Stratonicea in Caria, and Side in Pamphylia, which will find their place in a general study of the Byzantine city.
- 32 This dating will be considered below. For the city walls, see *Milet* II.3. 114-117, *Milet* I.7 54f with plan, fig. I and illustrations, figs. 4 and 7, and *Milet* II.1.13, 41. Theatre castle: Müller-Wiener (1961) 24-37 and (1967).
- 33 Traces of a wall leading southeast from the baths of Faustina led the excavators to suppose that the circuit somehow made a figure 8 to encompass a substantial part of the southern half of the city:

- Milet II.3.* 116f. Whatever the explanation of this stub of wall which could only be followed a few metres, it is evident that the city wall was complete as described, for its towers face outward to the south and it forms a complete circuit. There is no evidence that it followed the line of earlier walls further south. The supposition was originally made because the small area seemed inadequate for Justinianic Miletus; with the later dating of the wall, this is no longer a problem.
- 34 It is not clear that these are part of the original constructions, though they appear to be earlier than the Comnene period.
- 35 Inscriptions: *RICA* 219; the proposed dating was advanced by Foss (1977b) 478.
- 36 Frequent Arab attacks on Asia Minor began before the middle of the seventh century and continued well into the ninth: for their routes and chronology see Lilie (1976) 60-177. The most probable time for the cities to take measures for their protection would appear to be earlier rather than later in this long period. Since the Arabs struck virtually at will throughout the peninsula, their arrival could be expected but not predicted. Cities, too vulnerable in their reduced area and too poor to man the long circuits of ancient walls, would have been prudent to erect fortifications before rather than after attack; hence, the seventh century seems a probable time for the first great wave of fortification building.
- 37 For description and illustration, see Müller-Wiener (1961) 97f. The walls on the other sides of the citadel belong to later rebuildings.
- 38 For the classical period, see the article of F. Dörner in *RE*, and for the Byzantine, Sölch (1920) 292-295.
- 39 Gabriel (1958) 23-30, with plans and photographs, some of them of parts now destroyed.
- 40 Compare fig. 13 with Nicaea fig. 28, above.
- 41 For history and description, see Hasluck (1910) 68-72 and Robert (1980) 93-98, with excellent photographs of the fortifications.
- 42 The elaborate entrance appears to belong to a rebuilding; it may have followed an original plan of a kind which would not be inappropriate for the Dark Ages.
- 43 See Foss (1982) 153-157, with illustrations and references.
- 44 The tower has approximate parallels in the irregularly shaped towers of the east side of the fortress at Ankara: see Jerphanion (1928), pl. 83.
- 45 For the history, see the references collected by Laurent (1958) 70-74; he, however, incorrectly identified the site. In 1982, I discovered the remains which, as far as I can determine, have never been described, and shall discuss them and their history in a separate study.
- 46 First noted by von Diest (1889) 61 and plotted on his map, reproduced in Robert (1980) 136, *q.v.* 104-106 for Claudiopolis.
- 47 This description is preliminary to a more detailed treatment of the Byzantine fortifications of Mysia.
- 48 For the plain to the east see Robert (1962) 43-82, and for the Caicus valley in general, Schuchhardt (1912), with 127f, for this site.
- 49 Studied and planned in Müller-Wiener (1961) 62-65.
- 50 In some parts, a later phase has been distinguished; it may belong to the time of the Comneni, a date previously assigned to the whole circuit. The plan and location, however, seem far less characteristic of the twelfth than of the seventh or eighth centuries.
- 51 See, for example, *MAMA* VI. 123-126. The fortifications appear to be unknown; they have now been surveyed, and a full publication is in press, as part of the survey of castles of Kütahya province by the British Institute of Archaeology, Ankara.
- 52 *Miracula Theodori* in *AASS* Nov. IV.53, secs. 13, 14, 15. The term employed for 'strongholds' is ὀχυρώματα. For a similar case at Ankara, when the inhabitants took refuge in salt mines in the mountains to escape the attack of al-Mu'tasim in 838, see Foss (1977) 78, and cf. the text of *Hudud al Alam*, cited above, Part 1. p. 16.
- 53 For the medieval history of Ankara, see Foss (1977) 72-84. This wall has not previously been attributed to Nicephorus: Jerphanion (1928) 214 assigned it to the rebuilding of Michael III, while for Mamboury (1934) it was the original wall of the citadel. The arguments of Jerphanion as well as the style of the walls confirm the priority of the upper wall. Its ninth-century repairs, however, identified by inscriptions, are notably different from the masonry of the lower wall. This should be earlier than the time of Michael III, for the point where the two walls join by the southeast tower show

- that the lower was earlier or contemporary with repairs to the upper: Jerphanion (1928) 192f. The only emperor who is recorded to have repaired the walls is Nicephorus. According to Theophanes 481, he 'built' the city, a word which, however inaccurate, would at least imply substantial construction. The supposition of Mamboury (1934) 151 that Leo III played a major role in constructing the walls is plausible because he reorganised the provincial administration and made Ankara the capital of the new Bucellarian theme, but has no support in the sources. It thus seems likely that the lower wall was the work of Nicephorus I, built in 806. For the description which follows, see Jerphanion (1928) 192-197.
- 54 For the citadel, see Jerphanion (1928) 191f.; it has not previously been dated.
- 55 On these, see Grégoire (1928) 437-449.
- 56 For these events, see Foss (1977) 78f.
- 57 For what follows, see Jerphanion (1928) 144-192, with abundant plans and illustrations.
- 58 Smyrna: *RICA* 82bis; cf. Müller-Wiener (1962) 63f., who suggests that these walls might have been on the southwest part of the circuit, where a plan of 1854 shows square towers relatively close together; they had disappeared by the beginning of the present century.
- 59 The case of Kütahya, where such bands may appear at an earlier date, will be treated in the report of the survey carried out there by the British Institute of Archaeology in Ankara, now in press.
- 60 Most of the following is a summary of Foss (1982) where further references will be found.
- 61 Foss (1982) 153; see above, 139 on Sozopolis.
- 62 Foss (1982) 157-159.
- 63 *Ibid.*, 159-161; see Hasluck (1910) 80-83 for its history.
- 64 Incorrectly described by Foss (1982) 160f. as recessed brick.
- 65 *Ibid.*, 161-166.
- 66 Details and illustration: *ibid.*, 188-192.
- 67 For detailed description, plans and views, see Müller-Wiener (1961) 65-75; cf. Foss (1982) 184-186. It is possible that this fortress was a product of the period when John's neglect of the fleet would have increased the need for coastal defences: see Ahrweiler (1966) 226-233.
- 68 Historically, the reign of Alexius, which saw the reoccupation of the coastlands and their use as bases for further advance, would appear a suitable time for the construction of coastal fortresses, but the masonry at Anaea seems quite different from that of identified fortifications of Alexius; cf. the previous note.
- 69 Foss (1982) 166-171; these walls will be studied in detail in a report of the Pergamum excavation. Their preliminary report, Klinkott (1980), assigns these walls to the late thirteenth century because they use round towers and their poor masonry is appropriate to a late date. These conclusions seem based on inadequate consideration of comparative material, which clearly shows that round towers are common in this period as in others, and that the masonry is comparable with that of other fortifications which may be dated to this time. It is, of course, probable that the walls were repaired or rebuilt in later times, but there is no reason not to assign their basic structure to Manuel Comnenus. My thanks to Professor Klinkott for sending a copy of his article.
- 70 Identified and discussed in Foss (1982) 186-189.
- 71 Cinnamus 36, Choniates 52; see above, 140.
- 72 See Toy (1930) 226-228, with drawings, photographs and the suggested dating; cf. Gabriel (1943) 78-81 for a more complete plan and further illustration. The upper part is now a military zone and cannot be visited, but the excellent photographs of Toy and Gabriel provide sufficient material for study.
- 73 Foss (1982) 193-197. The Comnenian sections of the walls of Ephesus, which represent repairs to existing walls, need not be considered here.
- 74 Ducas 141-143; cf. Ahrweiler (1965) 84-88 whose identification of the site with Temnos is incorrect. I shall discuss the site and its identification in another context; meanwhile, see Schuchhardt (1912) 103f.
- 75 For the theme of Neocastria, see the unclear discussion of Ahrweiler (1965) 133-137, 163-165.
- 76 For the inscription, see Kalinka (1933) 102 n. 78, and for the site, its history and walls, the admirable study of Hoepfner (1966) 40-49.
- 77 *CIG* 8748, found 'in marmore in parietinis urbis'.

- 78 For detailed discussion, with history, plans and illustrations, see Müller-Wiener (1962) 60-84. The notion of this easily defensible hilltop not having a separate fortification wall on the side from which it was most likely to be attacked, but rather merely being incorporated in the vast circuit of the city walls, seems implausible. The Byzantine city is so poorly known, however, that no conclusions may be drawn.
- 79 The earliest Byzantine walls (Müller-Wiener's period II), which use well-coursed spoils of older walls and some headers and stretchers, would appear to be of the Dark Ages; the following (IIa), with its less careful use of the same kind of spoils, might find its parallel in the ninth-century walls of Ankara; while the third (IIb) which has much horizontal and some vertical brick in the joints, could be Comnenian. The Lascarid masonry is of Type III. If the development of Smyrna were at all like that of other Anatolian cities in the Dark Ages, it would have withdrawn to its acropolis, and the lower city been abandoned.
- 80 For the history and walls of Magnesia, see Foss (1979) 306-309.
- 81 For the fortifications, see *ibid.*, 309-312, 318 and for the features and antiquities of the site, Robert (1980) 384-392 with excellent photographs.
- 82 Foss (1979) 299-302.
- 83 *Ibid.*, 314-316.
- 84 They are treated in detail by Müller-Wiener (1961); for what follows, see *ibid.*, 9-14 (Afşar), 17-19 (Mersinet) and 46-56 (Priene). Keçikalesi near Ephesus (112-116) seems to stand apart with a rougher masonry and far more sophisticated defences, which suggest a Turkish rather than a Byzantine date.
- 85 *Ibid.*, 14-16; cf. Robert (1978) 507 (identification with references), 505-507 (views).
- 86 For the latter, see Wiegand (1913) 78f, where they are called prayer niches. Although this area was inhabited by monks, there seems no reason to ascribe such piety to the garrison of a town which was the regional administrative centre. The drawings indicate rather that these 'niches' were embrasures blocked at some later period.
- 87 On these, see Buchwald (1979).
- 88 Described in detail, with plans and illustrations in Wiegand (1913) 18-24, 51-55.
- 89 Summary description with plan in Hasluck (1910) 98ff.
- 90 I owe this explanation to a suggestion of Dr Stephen Mitchell, with whom I visited the site.
- 91 Hasluck (1910) 118f.
- 92 Briefly described in von Diest (1898) 14.
- 93 Hasluck (1907) 299f.
- 94 Pachymeres II. 414.
- 95 Robert (1983) 65-83 with plan and excellent photographs. It is not clear whether the walls represent one or two periods. For the Byzantine history of the site, *ibid.*, 27-29.
- 96 For what follows, see Meriç (1982) 24-30, 34f.
- 97 The fortress of Keçikalesi in the same region is perhaps also to be attributed to them: see above, n. 84.
- 98 Meriç (1982) 20; the coins are neither listed nor identified. It is not clear whether the lack of Byzantine material reflects the interests of the surveyors or a historical reality.
- 99 References above, n. 72.
- 100 Foss (1979) 311f., 318.
- 101 See, e.g. Müller-Wiener (1961) 57ff.
- 102 For Rome, see the convenient summary of Todd (1978) with references to earlier work.
- 103 Cribwork appears behind a facing of the Dark Ages at Sozopolis (see above, 139) perhaps, but not necessarily, as a later repair. In other cases, the fine facing may still conceal such a system.
- 104 I shall treat this question, which lies outside the present subject, in a study of the early Ottoman conquests.

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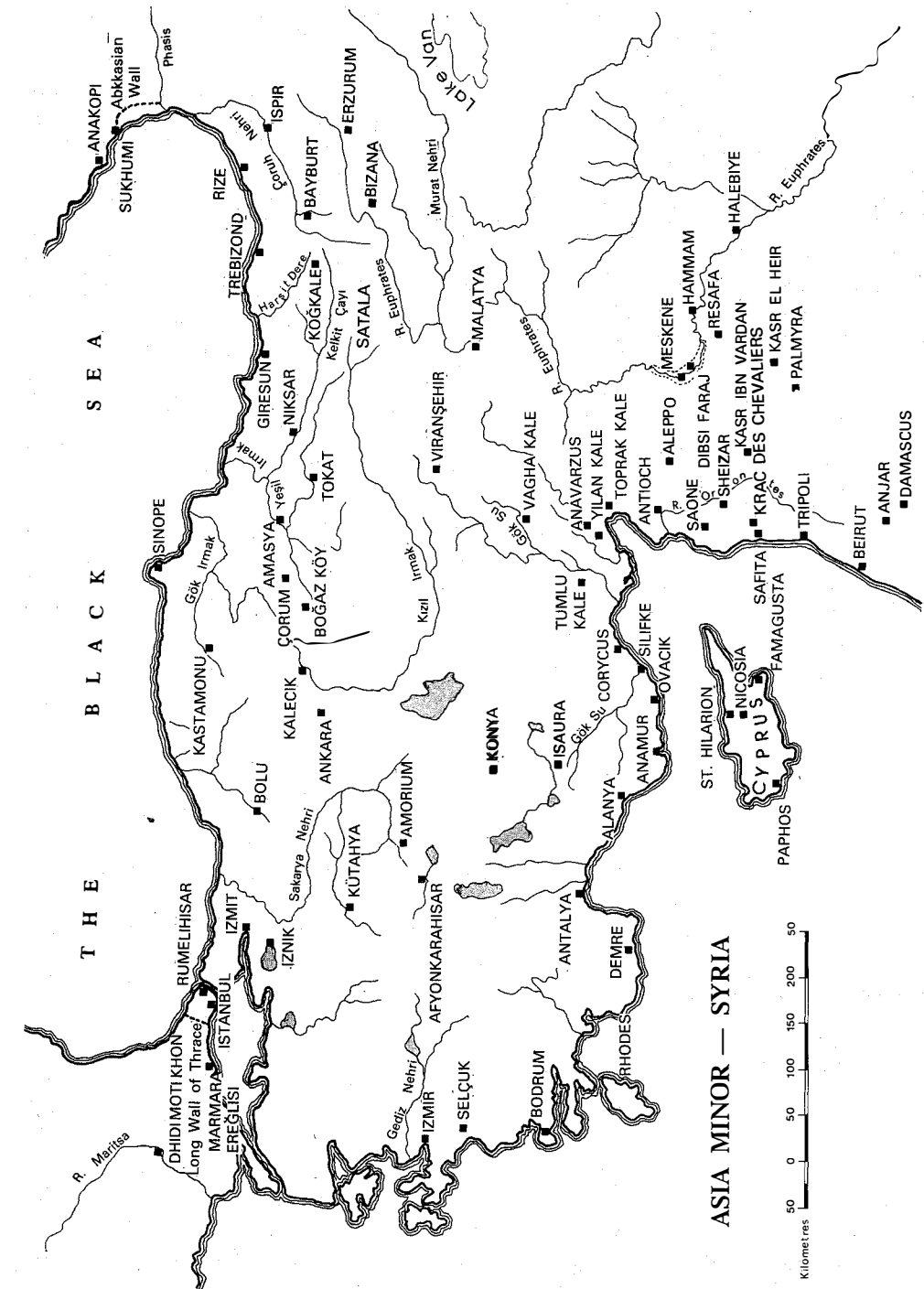
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Illustrations

PART ONE On Some Features of Byzantine and Western Medieval Fortification



1 Fig. 1 — The Eastern Mediterranean Region showing the approximate whereabouts of some sites mentioned in the text

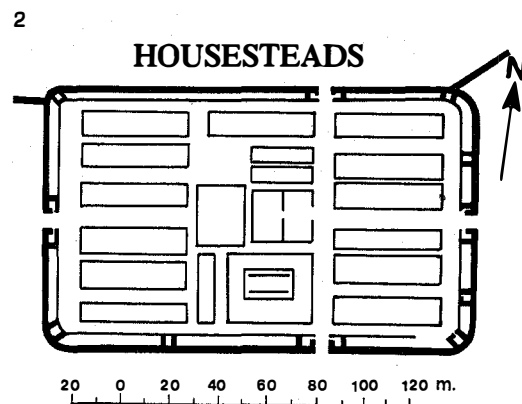


Fig. 2 - Plan of Housesteads, Roman camp

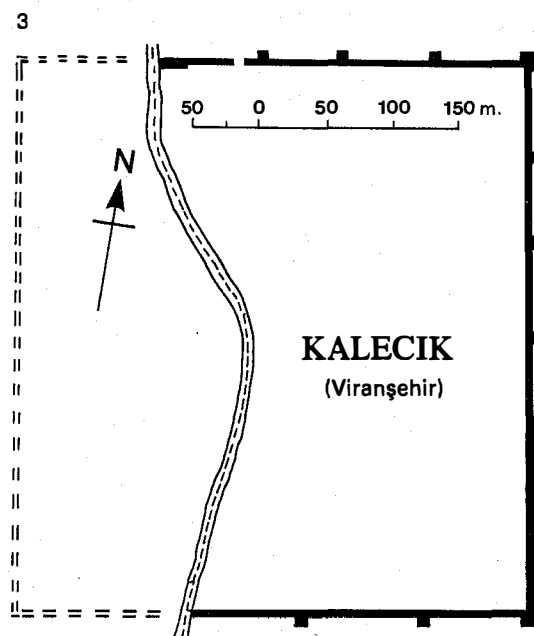
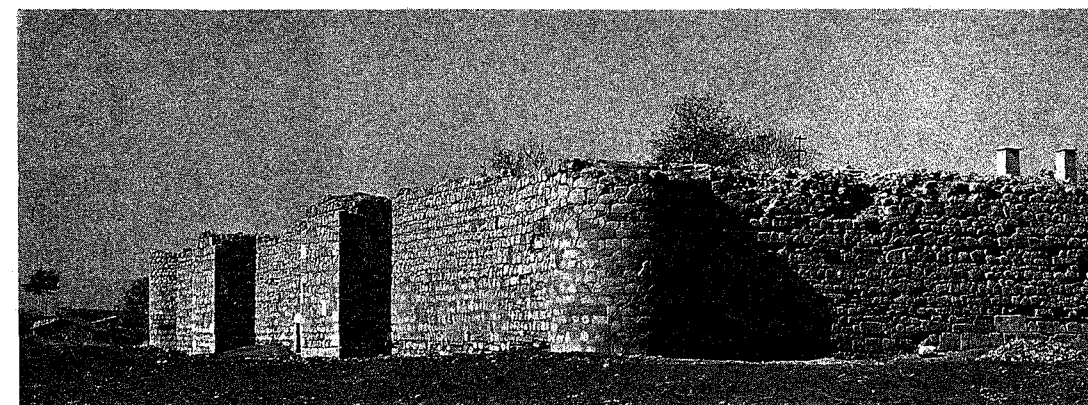
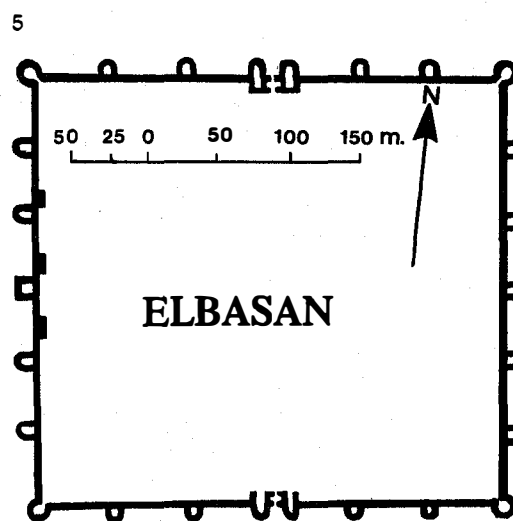
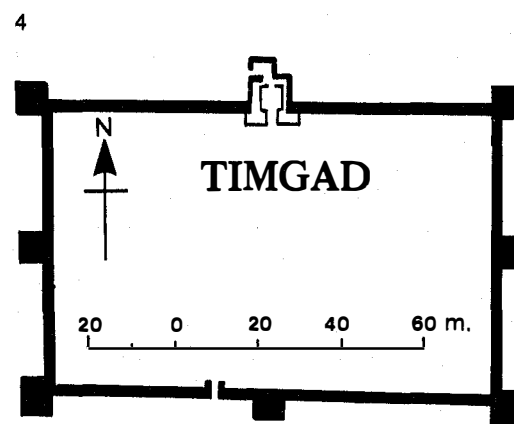


Fig. 3 - Plan of Timgad

Fig. 4 - Plan of Kalecik (Viranşehir)

Fig. 5 - Plan of Elbasan



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Fig. 6 - Çorum: rectangular fort

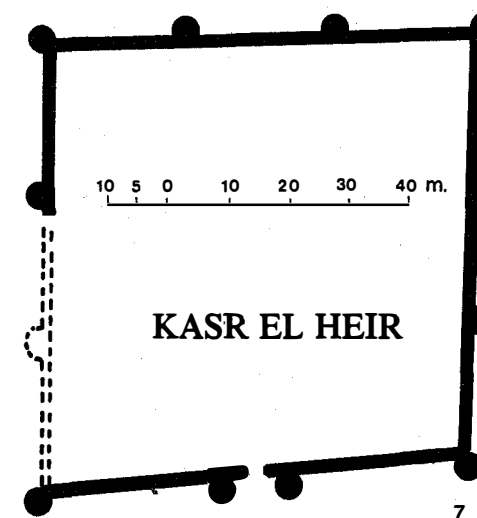
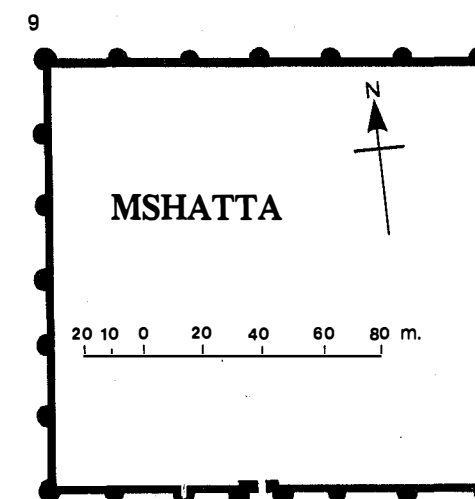
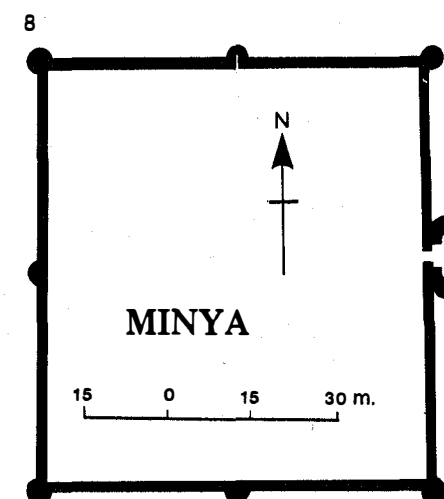


Fig. 7 - Plan of Kasr el-Heir, Umayyad

Fig. 8 - Plan of Minya, Umayyad

Fig. 9 - Plan of Mshatta, Umayyad





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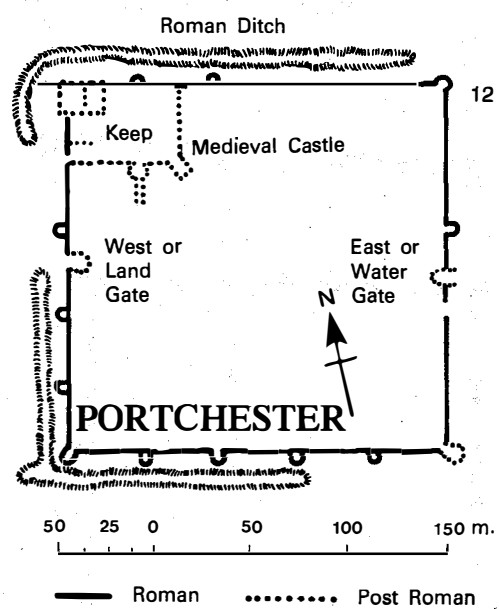
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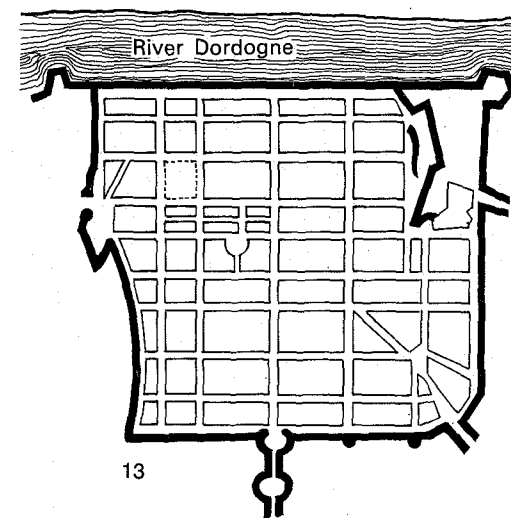
Fig. 10 – Kasr el-Heir:
rectangular township, eighth century

Fig. 11 – Plan of Kirkgöz,
Seljuk caravansary

Fig. 12 – Plan of
Portchester

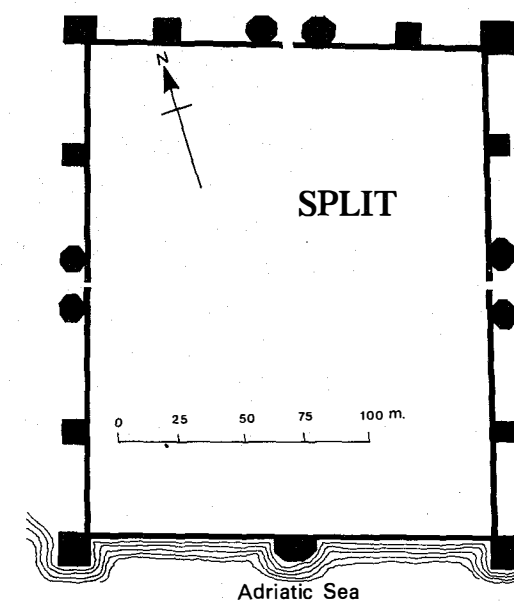


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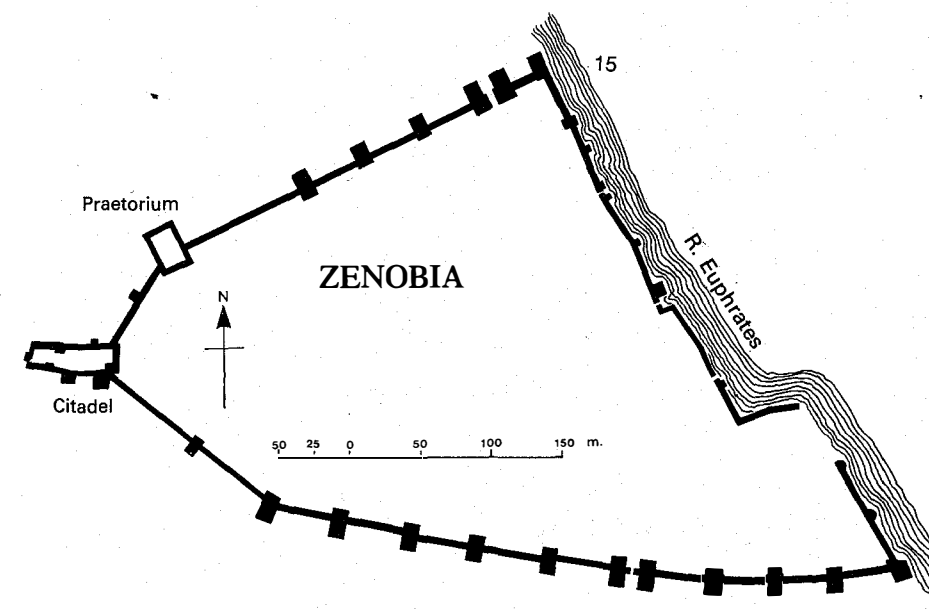
Fig. 13 – Plan of Sainte Foy



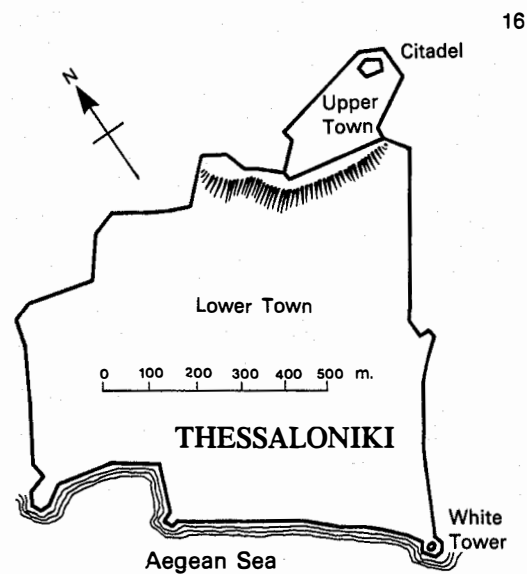
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Fig. 14 – Plan of Split

Fig. 15 – Plan of Zenobia



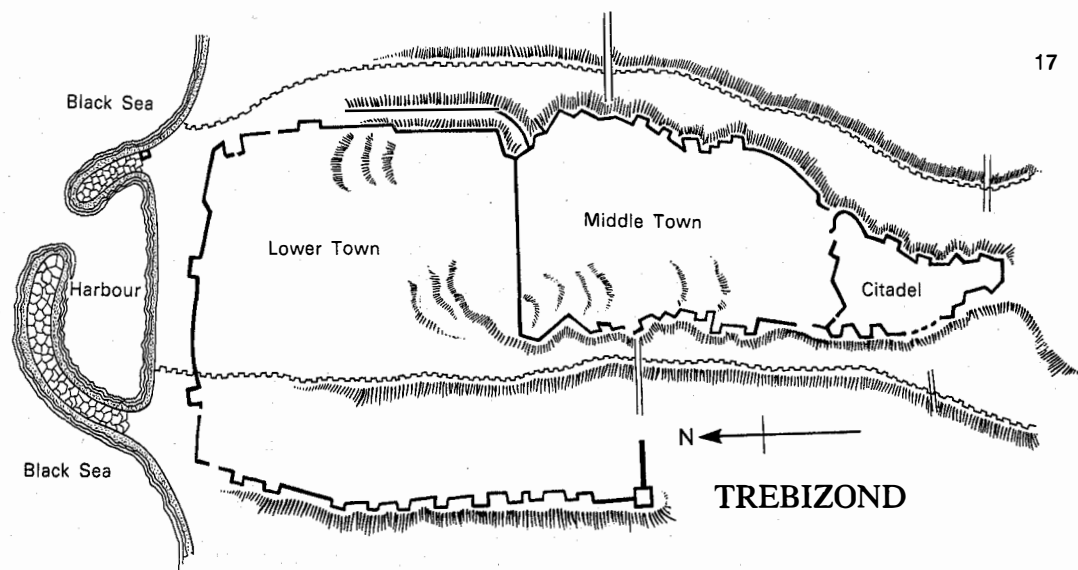
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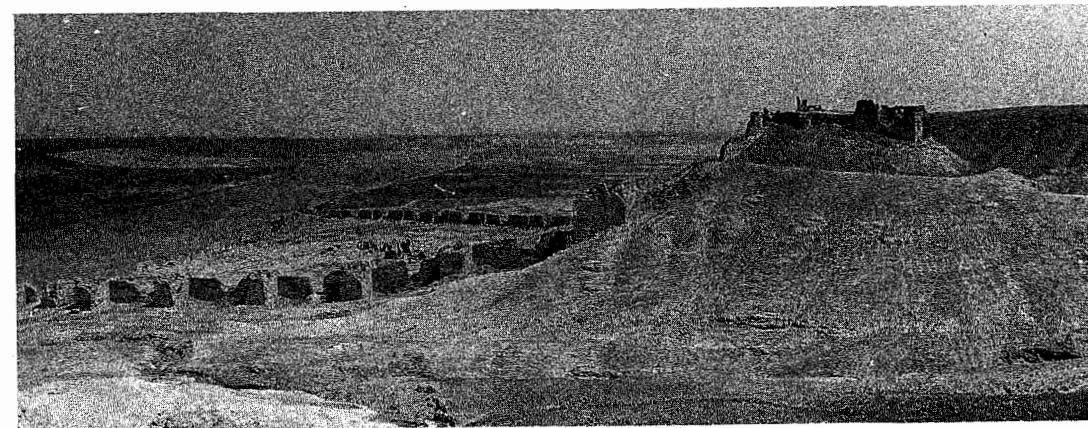
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Fig. 16 — Plan of Salonica

Fig. 17 — Plan of Trebizond



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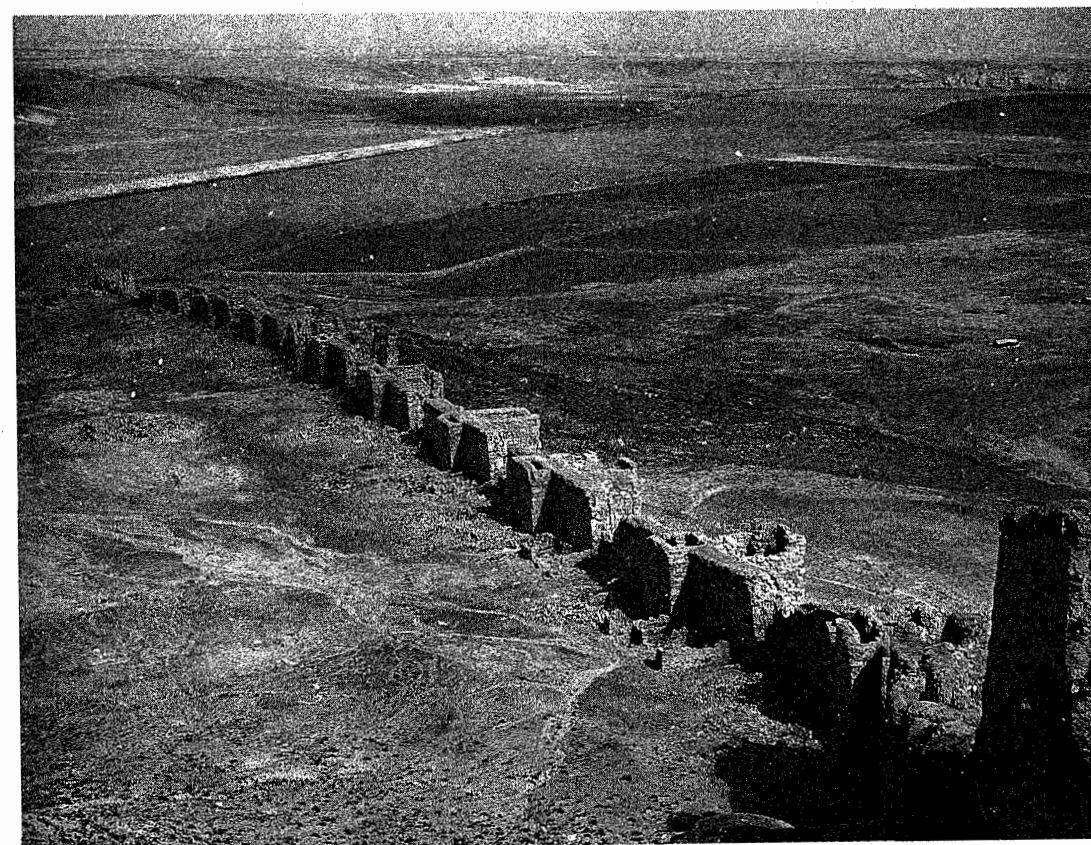


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Fig. 18 — Zenobia, general view

Fig. 19 — Zenobia, curtain wall

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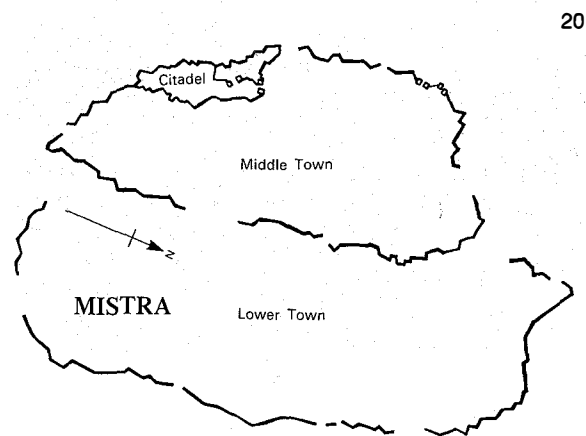


Fig. 20 – Plan of Mistra

Fig. 21 – Zenobia, main gate

Fig. 22 – Plan of Sergiopolis/Resafa

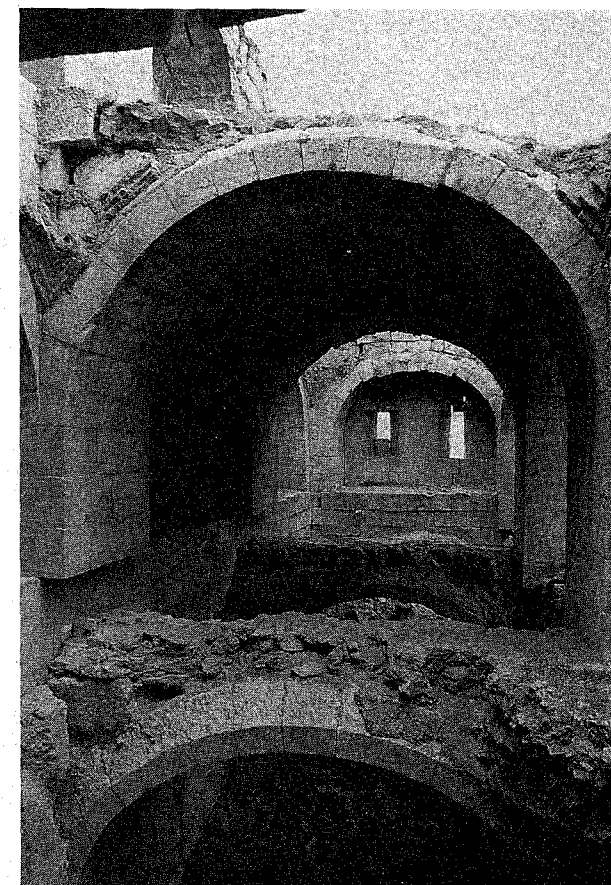
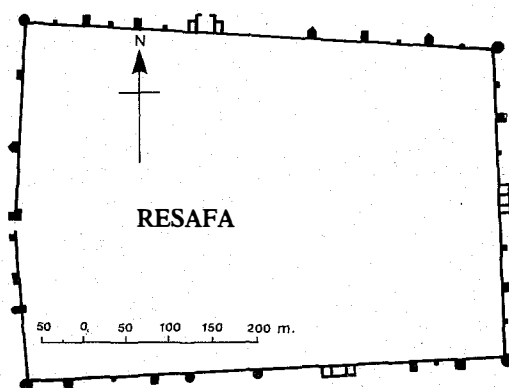
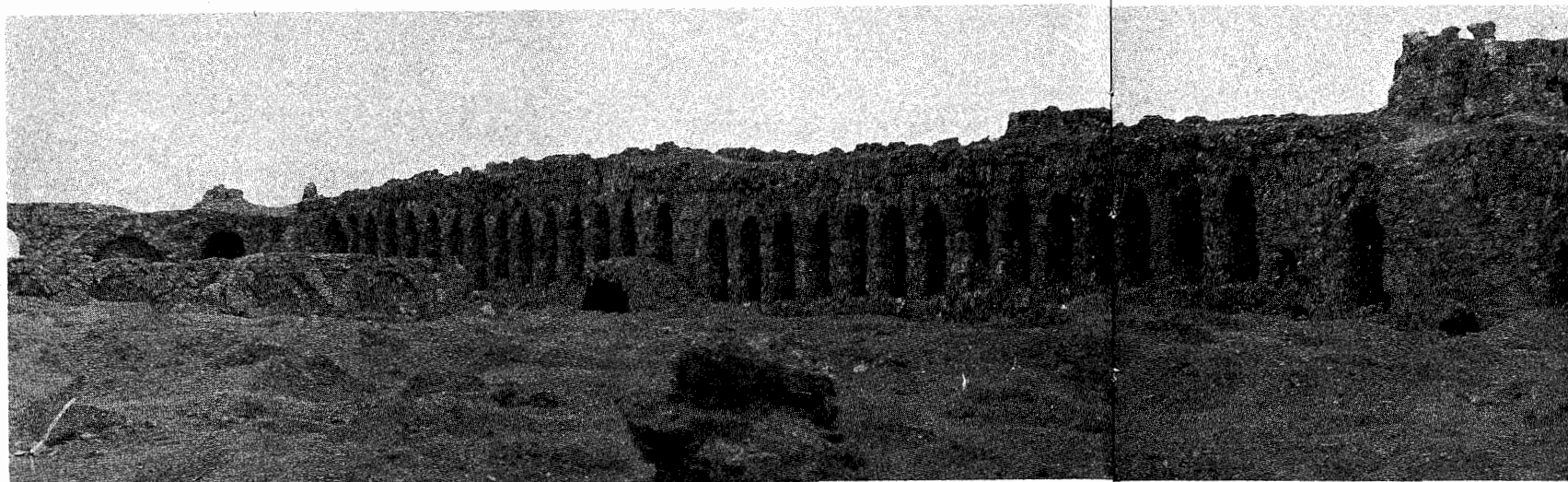


Fig. 23 – Zenobia, Praetorium

Fig. 24 – Sergiopolis, general view showing a prow tower





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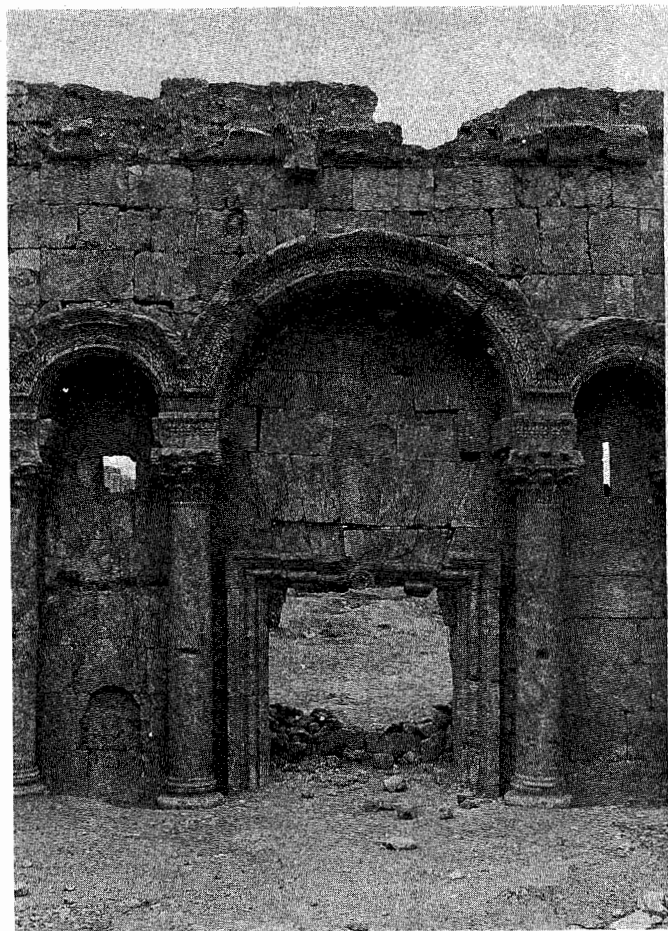
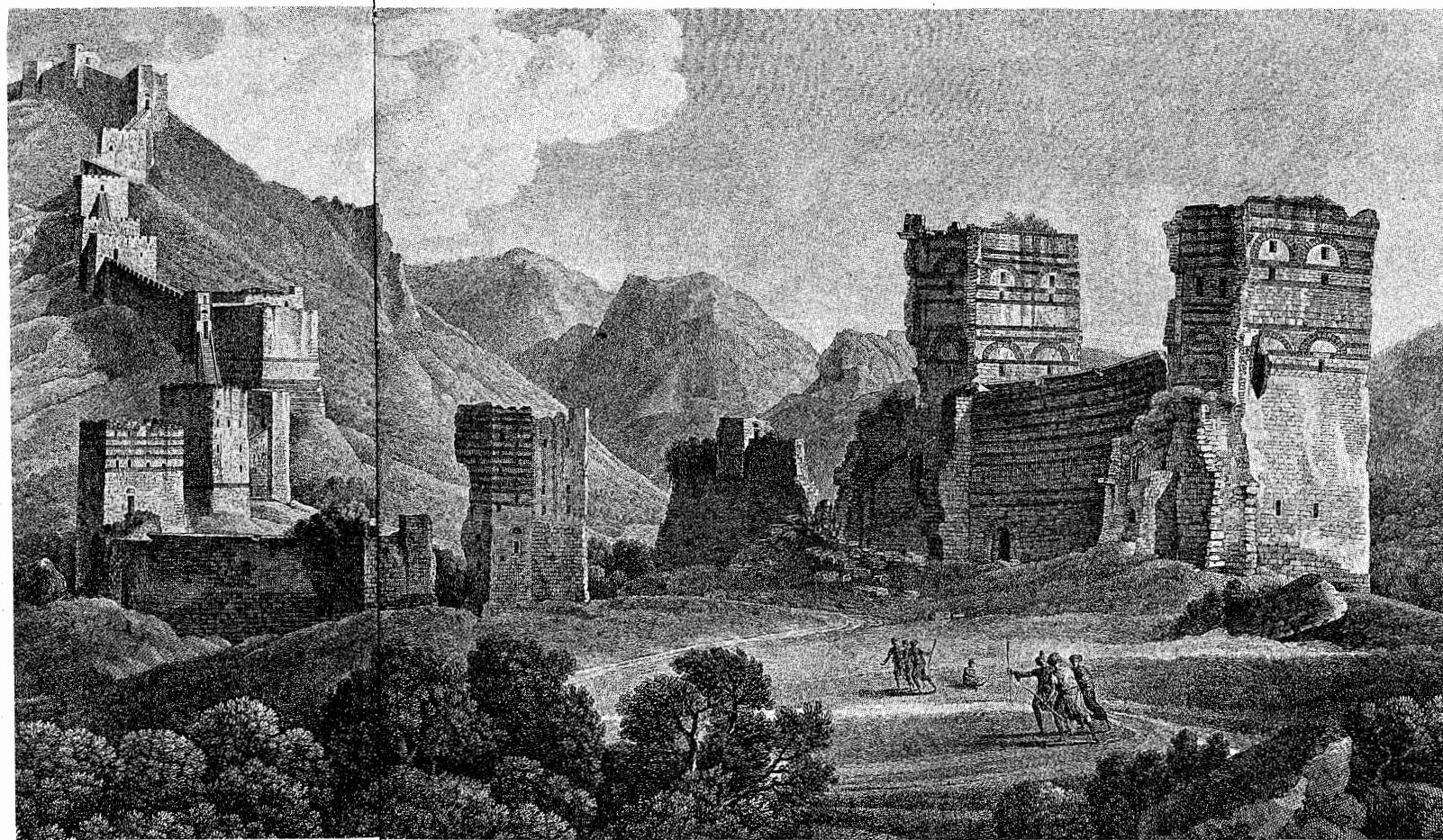


Fig. 25 — Sergiopolis, walls from interior with arched recesses

Fig. 26 — Sergiopolis, main gate

Fig. 27 — Antioch: a 19th century view of the walls, now nearly all demolished



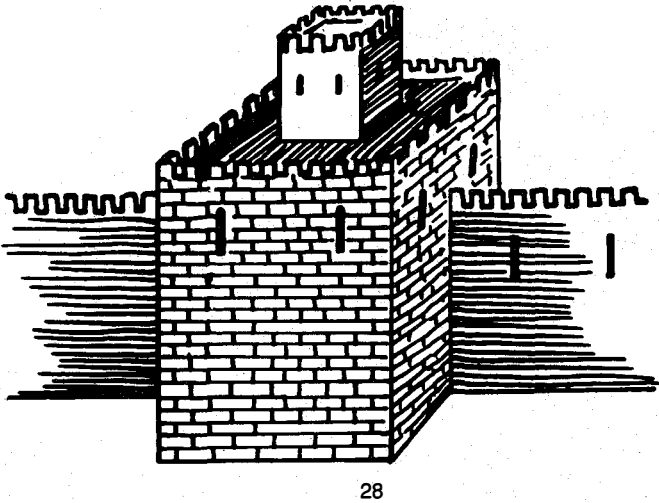


Fig. 28 – Reconstructed drawing of a 'pyrgocastellum' with central turret

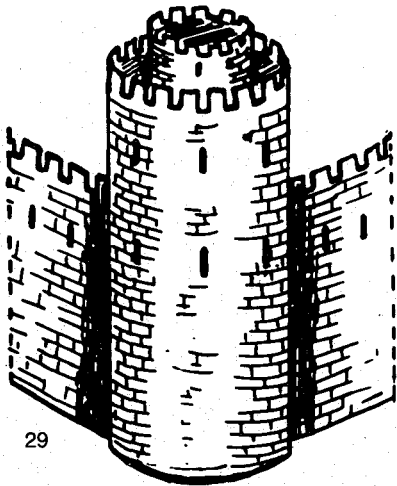


Fig. 29 – Reconstructed drawing of a round corner tower with central turret

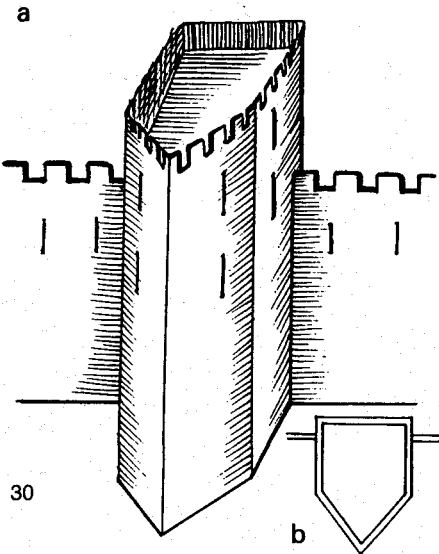


Fig. 30 – The pentagonal prow tower, a hallmark of Byzantine military architecture.
a) A reconstruction drawing
b) ground plan

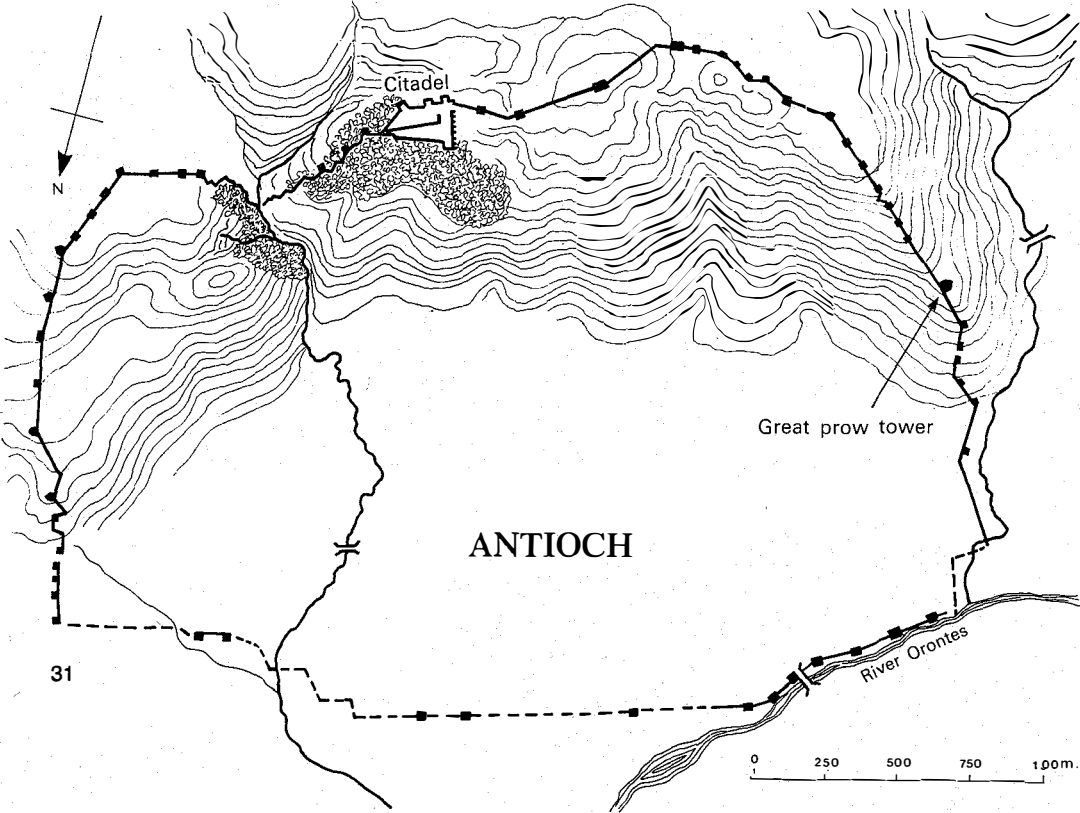


Fig. 31 – Plan of Antioch

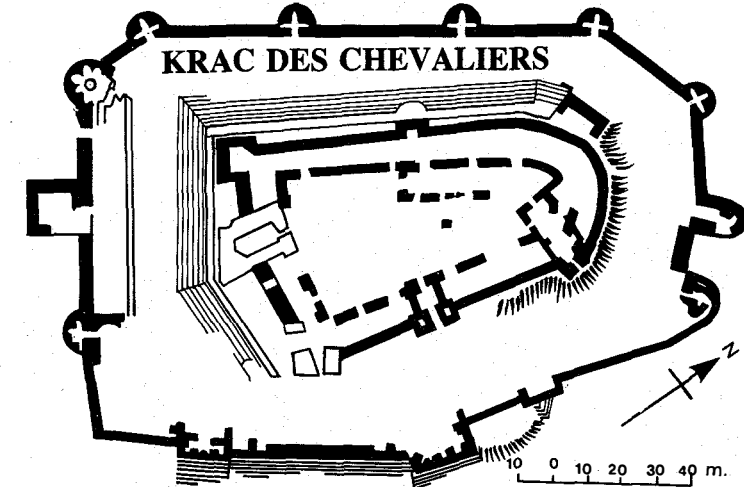
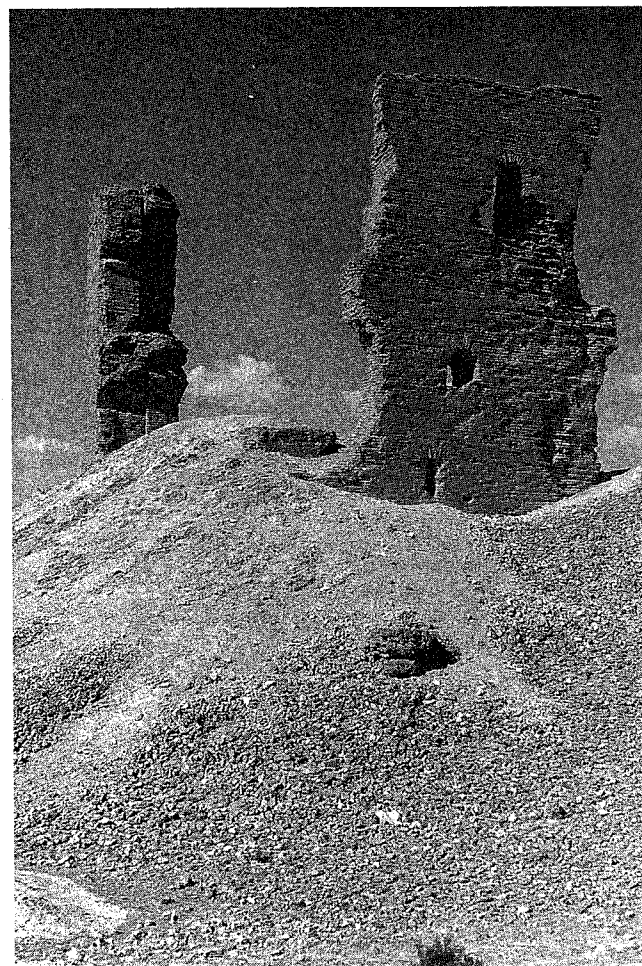


Fig. 32 – Plan of Krac des Chevaliers

■ 12th century construction



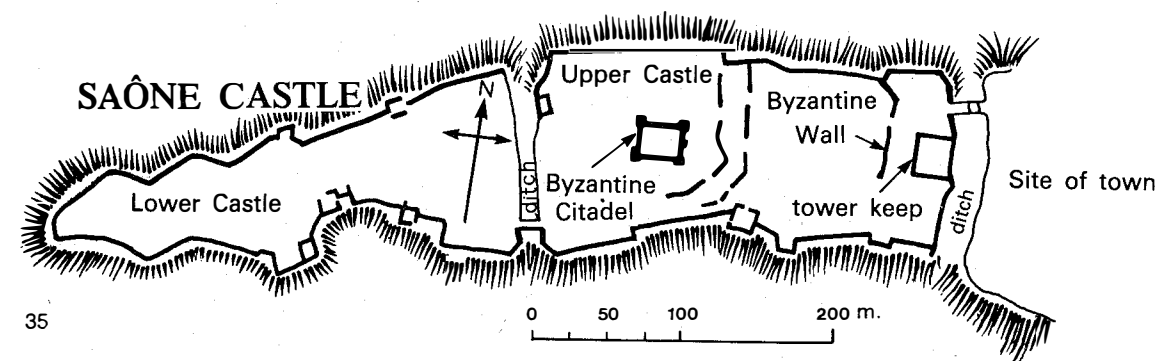
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Fig. 33 – Narbalissos, general view showing a minaret on the left and the Great Tower, or Tower Keep, on the right

Fig. 34 – Narbalissos, Great Tower or Tower Keep wall openings



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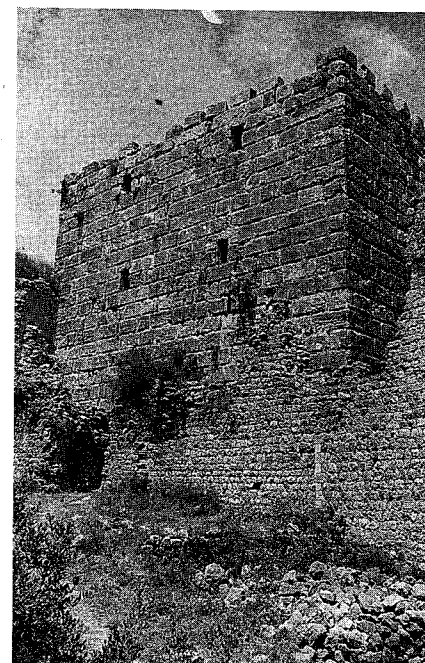


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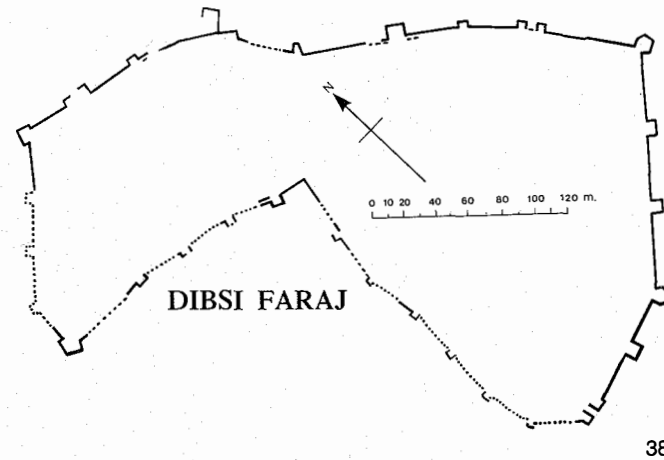
Fig. 35 – Plan of Saône

Fig. 36 – Saône, general view

Fig. 37 – Saône, the Great Tower or Tower Keep with Byzantine walling in the foreground



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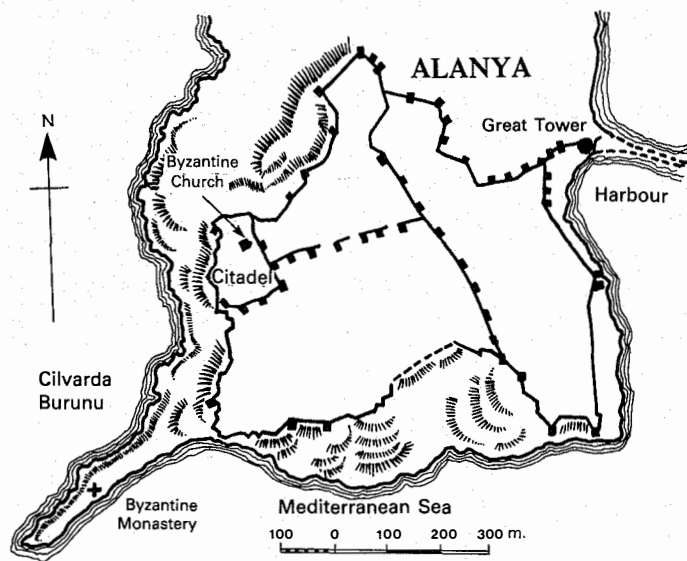
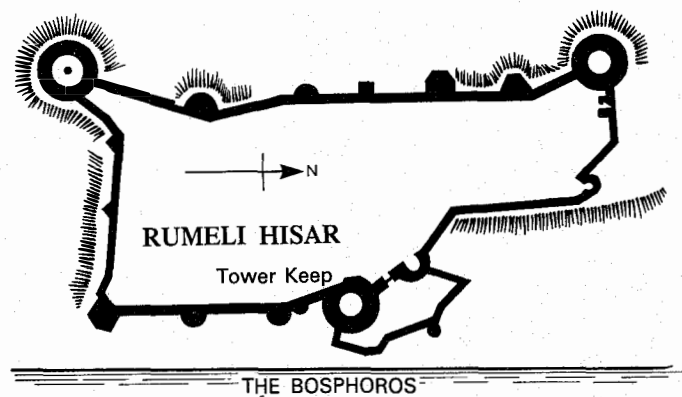


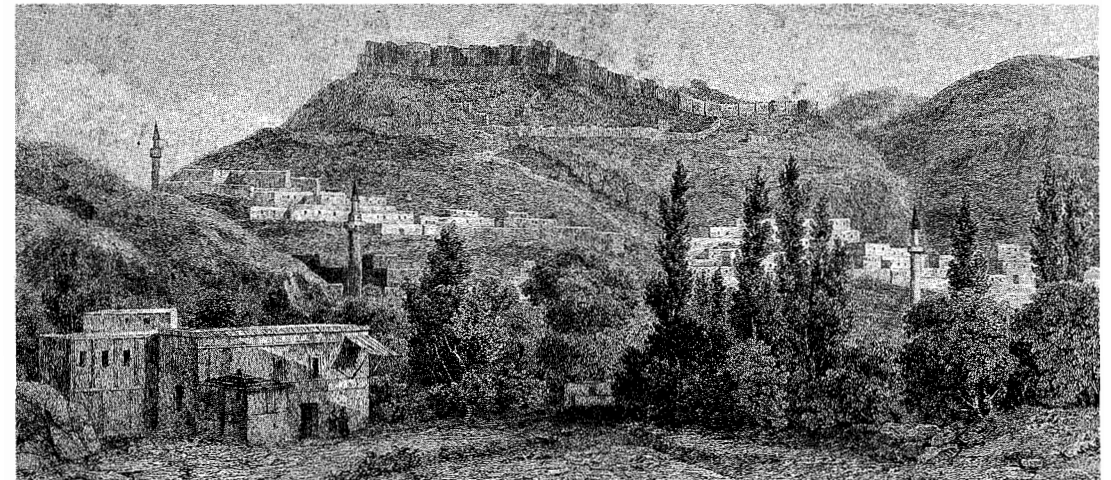
Fig. 38 – Plan of Dibri Faraj

Fig. 39 – Plan of Coracesium / Alanya showing Great Tower or Tower Keep

Fig. 40 – Plan of Rumeli Hisar showing Great Tower or Tower Keep



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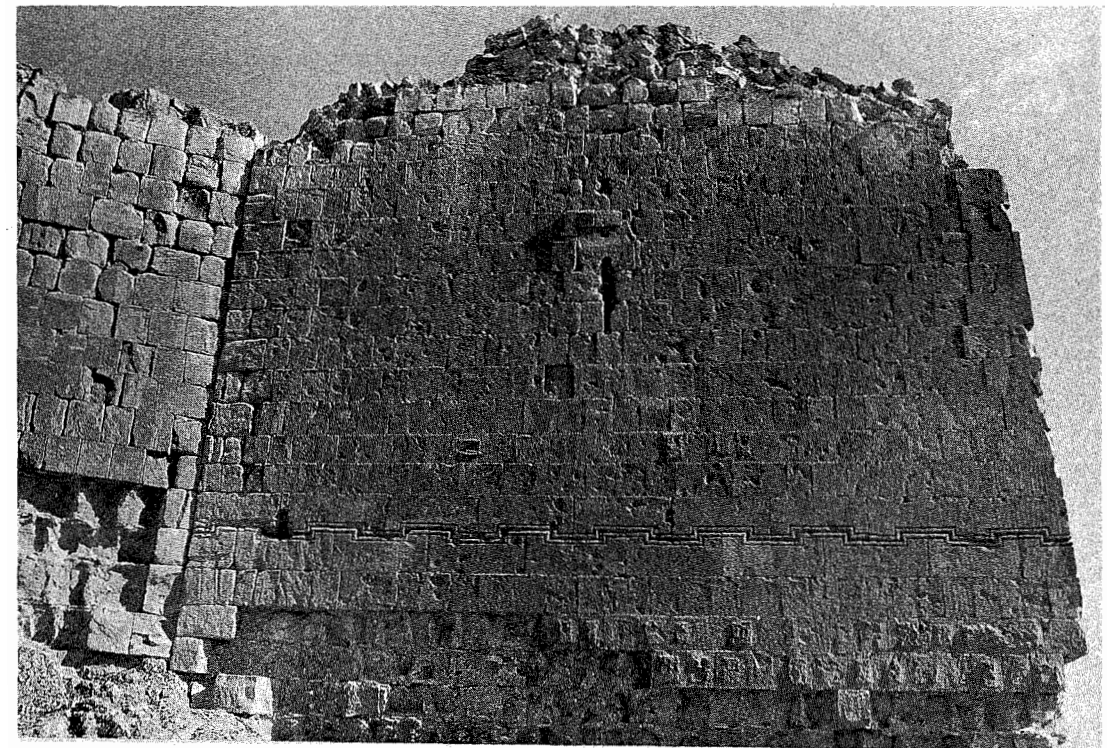


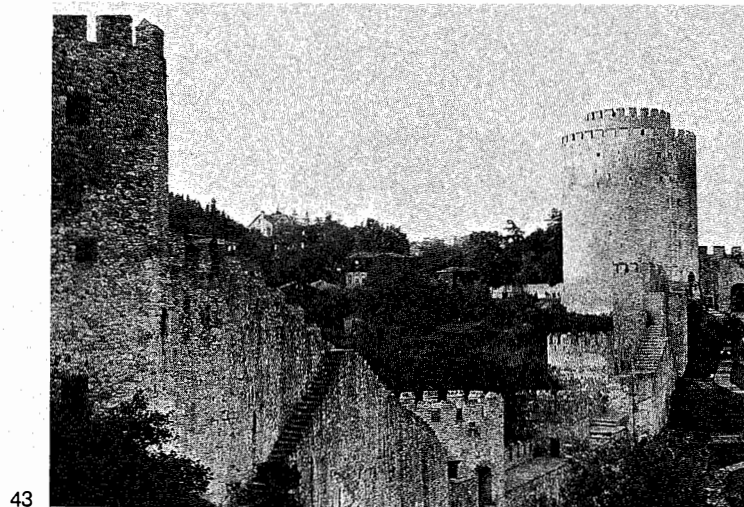
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Fig. 41 – Bayburt: late 12th century Seljuk castle, after Texier

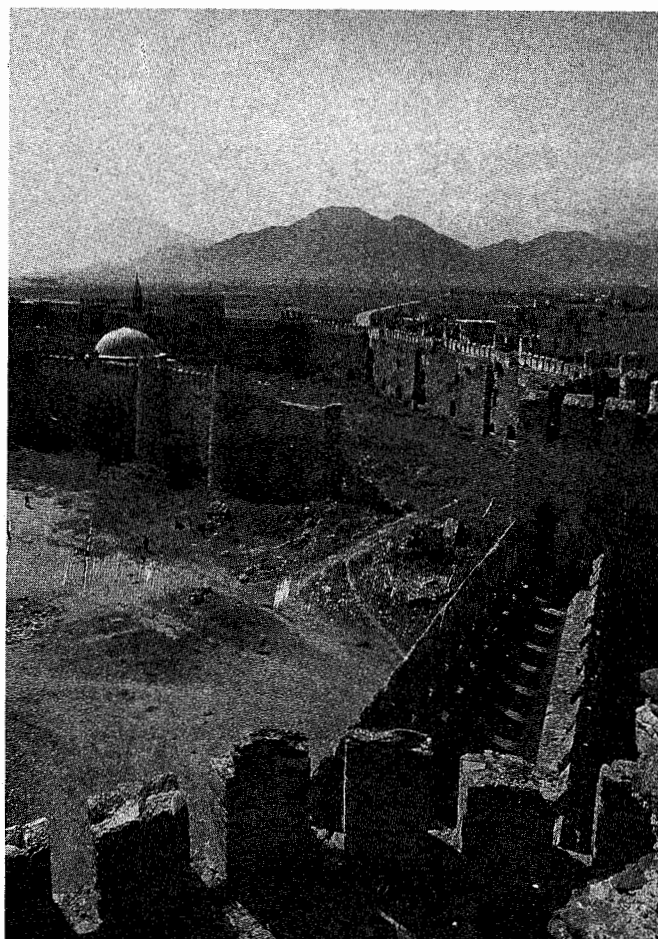
Fig. 42 – Bayburt: high quality ashlar masonry typical of Seljuk building

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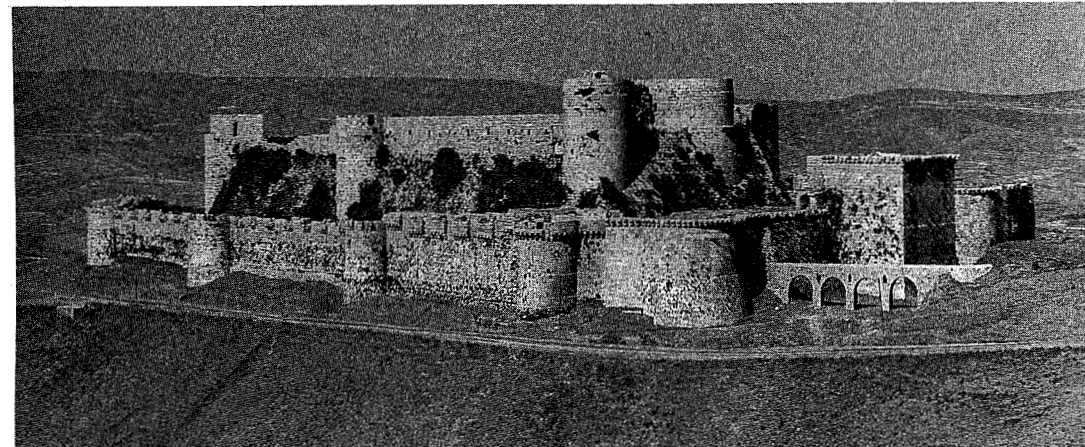
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*Fig. 43 – Rumeli Hisar:
western curtain wall
and northern Tower Keep*

*Fig. 44 – Anamur: the Turkish
castle looking northwest from
the Great Tower or Tower Keep.
Note wall walk with
battlements on either side*



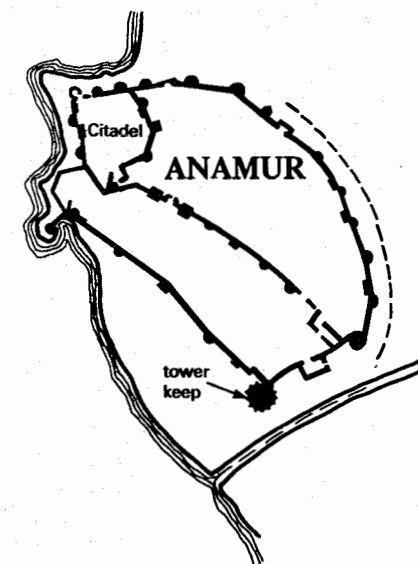
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Fig. 45 – Krac des Chevaliers from the southwest

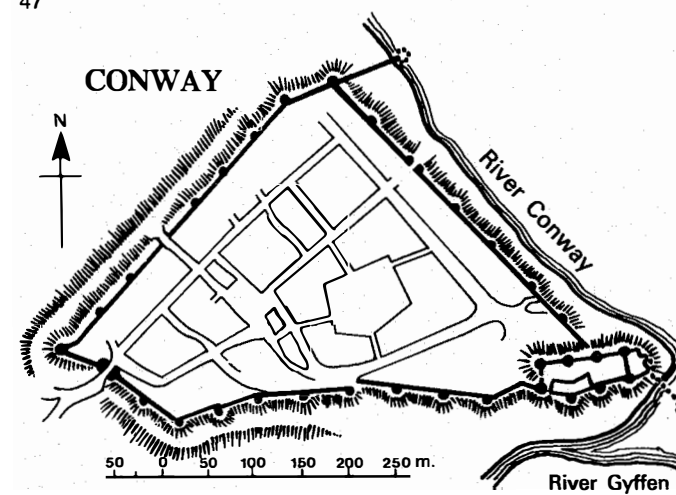
Fig. 46 – Plan of Anamur

Fig. 47 – Plan of Conway, town and citadel

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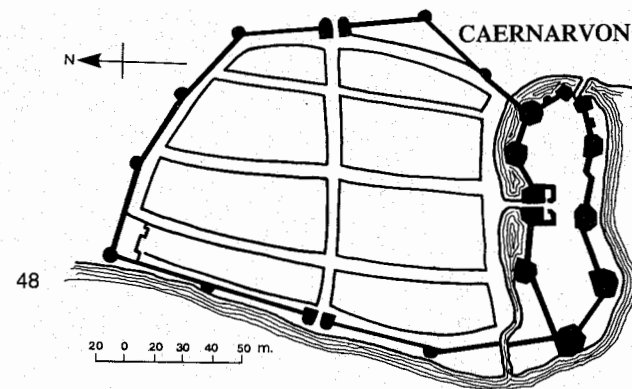


Fig. 48 – Plan of Caernarvon, town and citadel

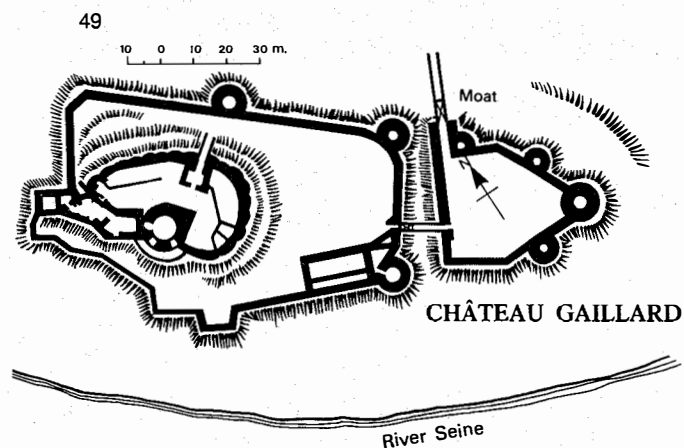


Fig. 49 – Plan of Château Gaillard

Fig. 50 – Koyulhisar, Northern Turkey, a castle on a spur, with ruined gatehouse in the foreground

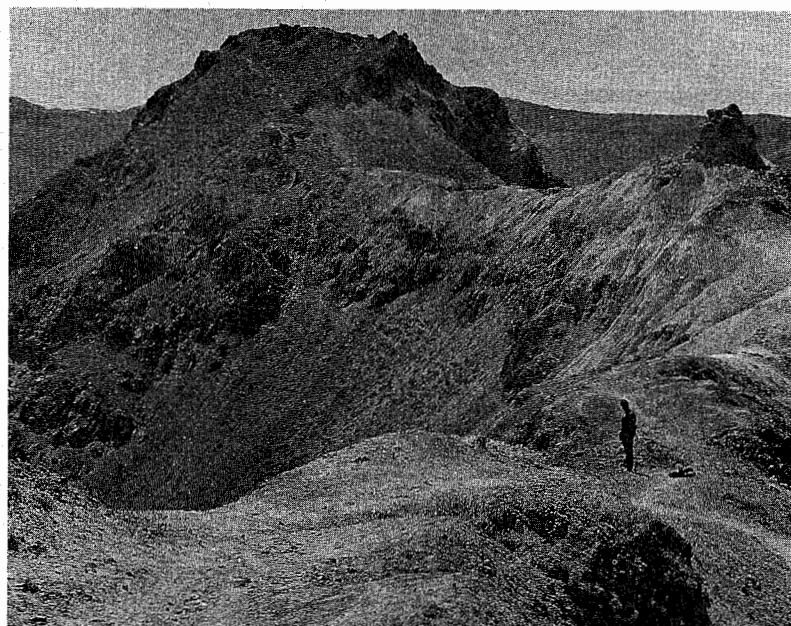


Fig. 51 – Kalecik, a Byzantine castle on a hilltop site

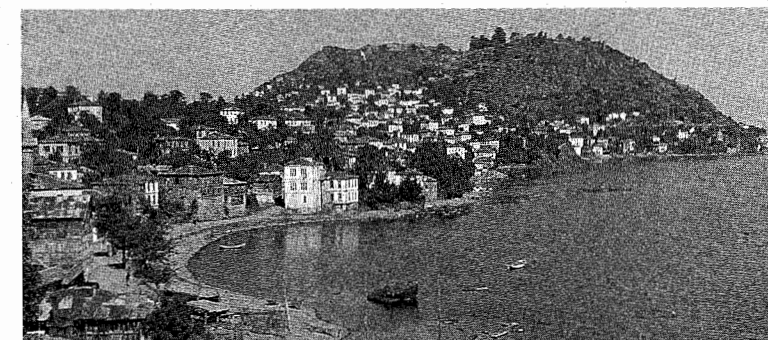
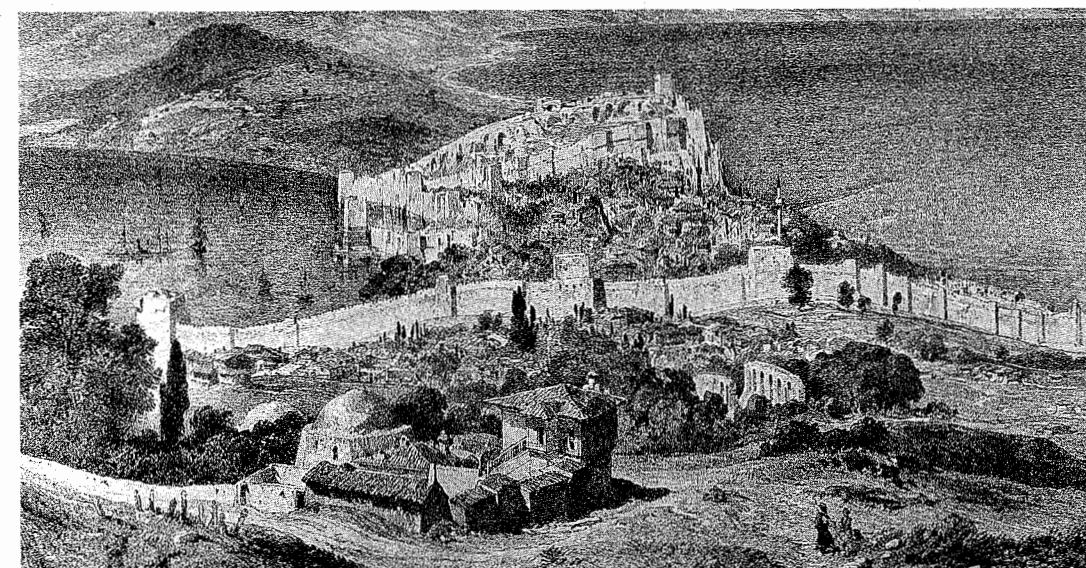


Fig. 52 – Cerasus, Giresun, a Classical and Byzantine promontory site with the citadel on the hilltop

Fig. 53 – Sinope: promontory site with the citadel on the landward end of the isthmus; after Laurens



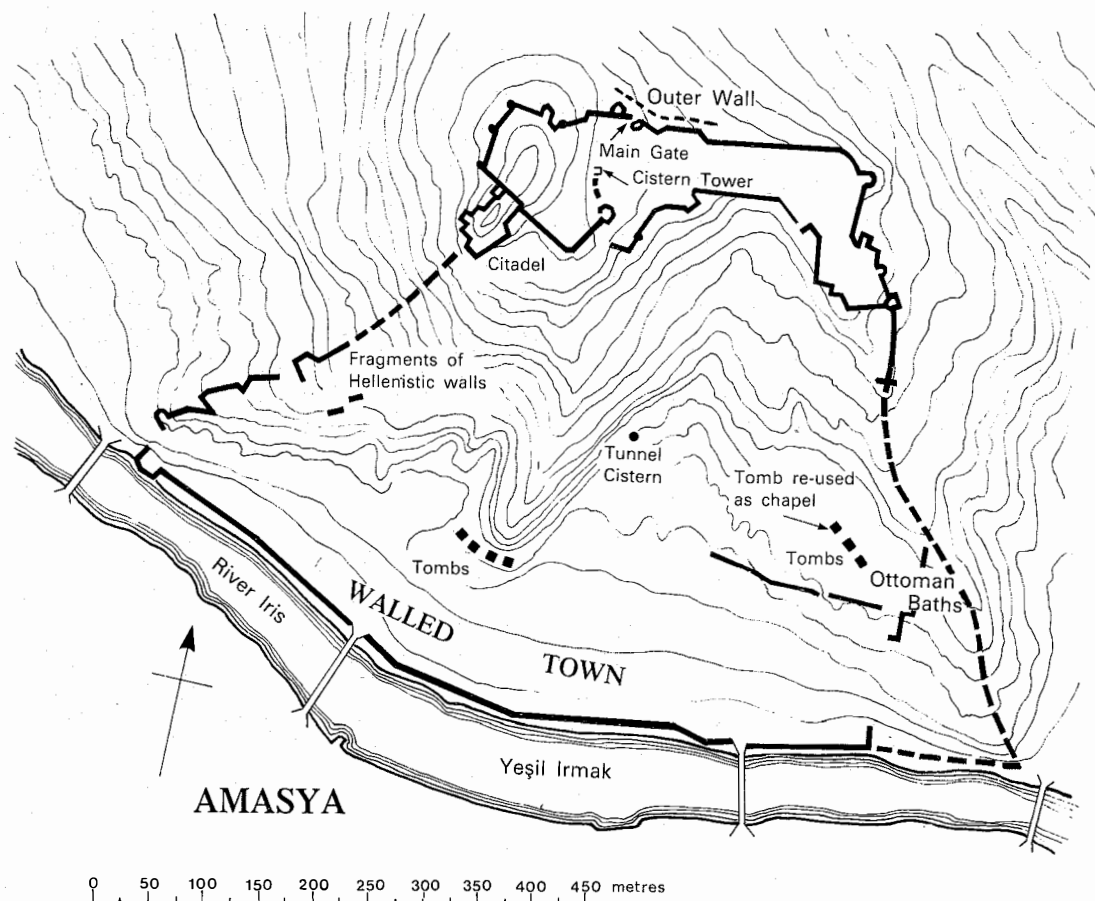


Fig. 54 – Plan of Amasya

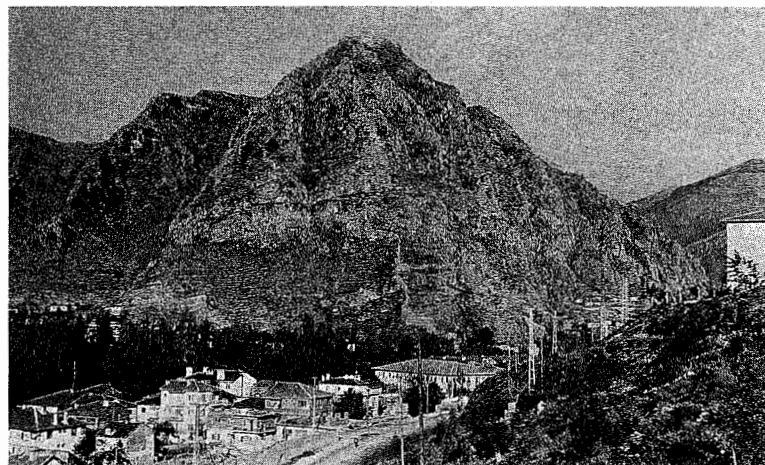


Fig. 55 – Amasya: the citadel rock from the southwest; the town and the river Iris are in the valley to the right



Fig. 56 – Amasya citadel: Mithridatic, Roman and Byzantine masonry

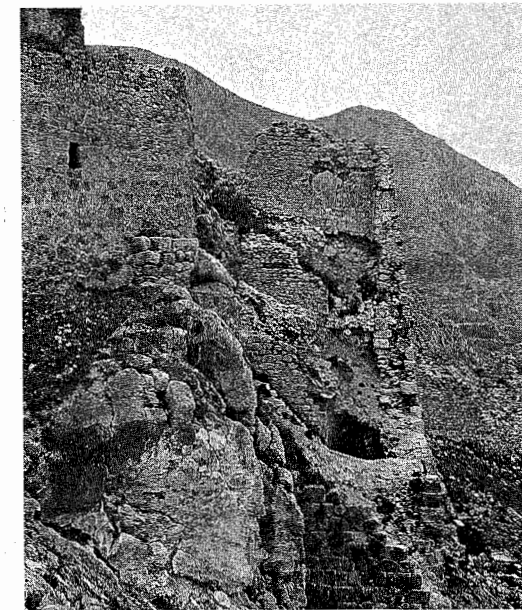


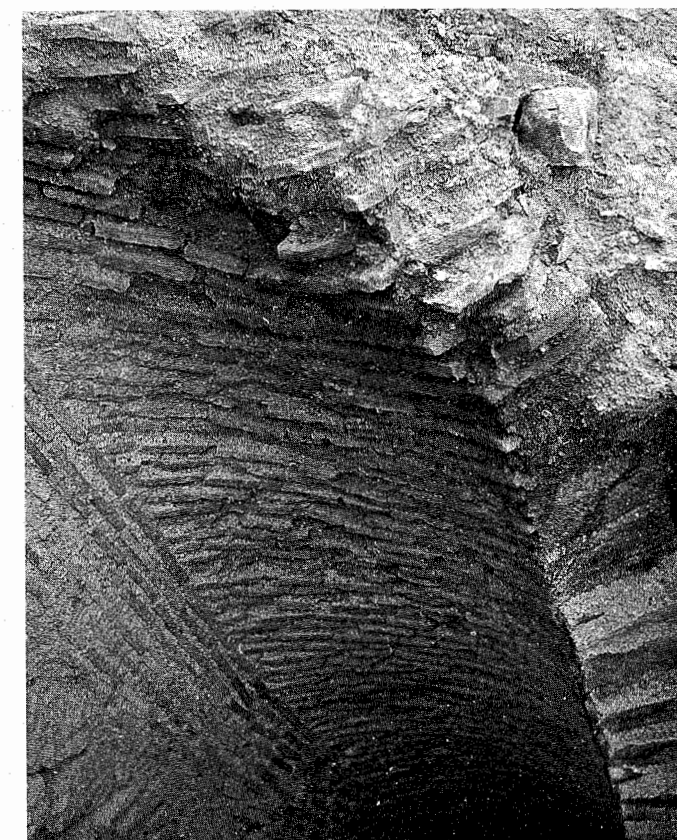
Fig. 57 – Amasya: the outer eastern wall of the citadel with the Byzantine water tower

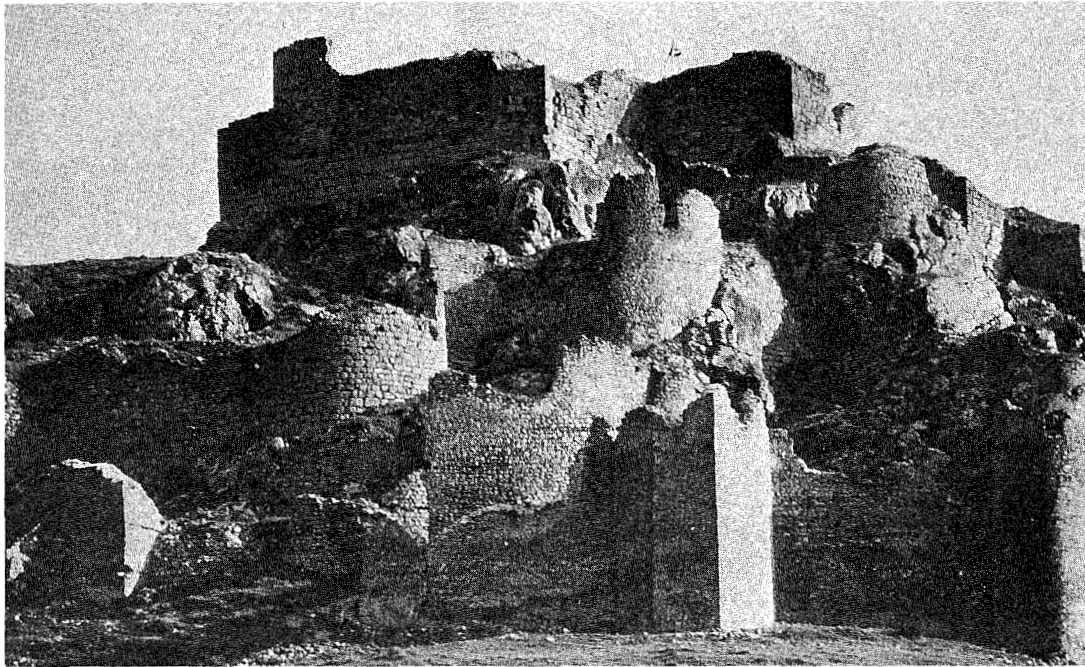
Fig. 58 – Amasya: cistern tower: Byzantine pitched brickwork vaulting of the water tunnel

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Fig. 61 – Amasya:
citadel, north side:
Byzantine masonry 4a, c, d

Fig. 62 – Amasya: citadel,
Byzantine masonry 4b

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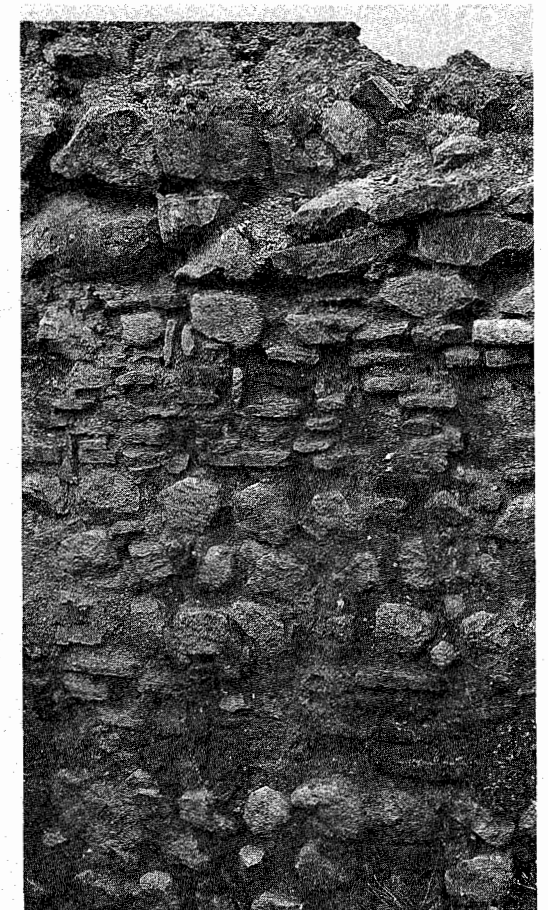


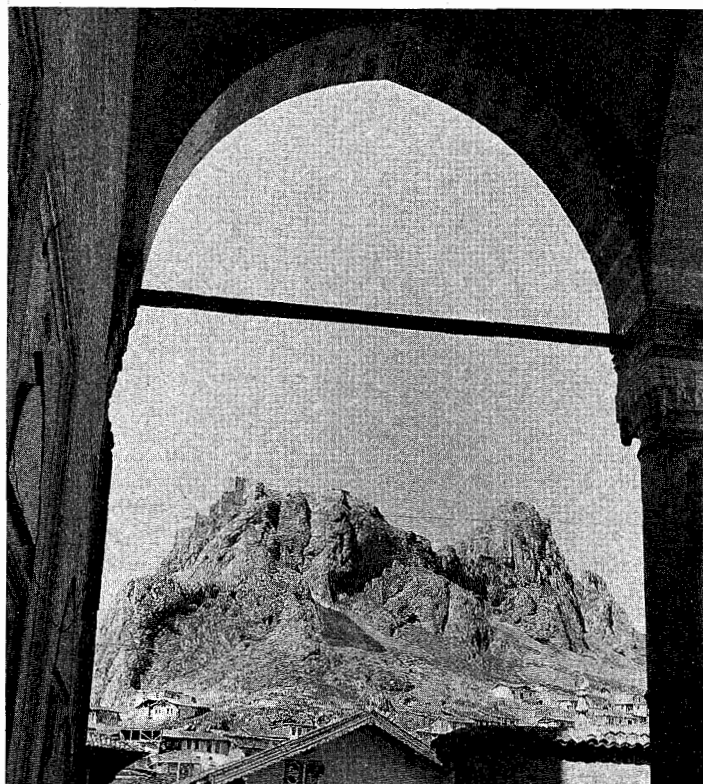
Fig. 59 – Amasya: the castle
from the northeast showing the old road
to the main gate, and the large prow
tower at the main gate

Fig. 60 – Amasya, the concentric
walls of the citadel, and a prow
tower in the outer wall

Fig. 63 – Tokat:
twin peaks of
Byzantine citadel
from the east

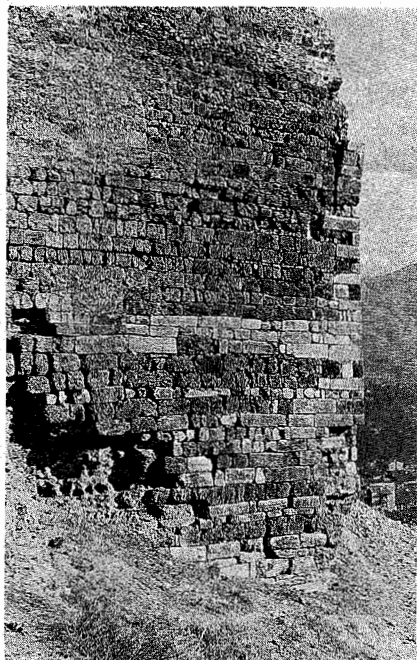
Fig. 64 – Tokat:
reused late
antique masonry
with Byzantine
type 1 above

Fig. 65 – Tokat:
detail showing
timber framework
in the core of the wall,
Byzantine type 1

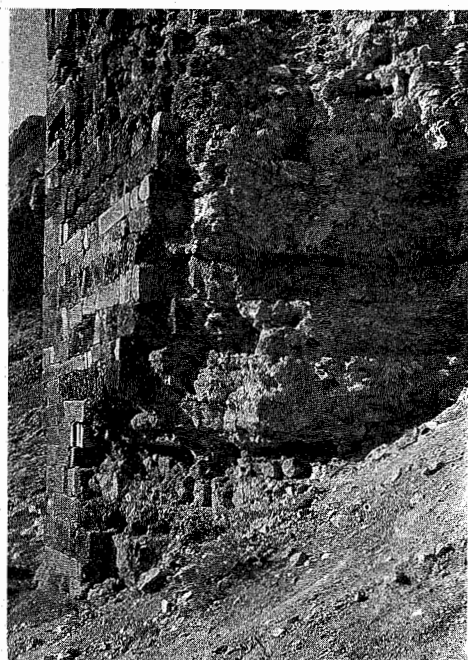


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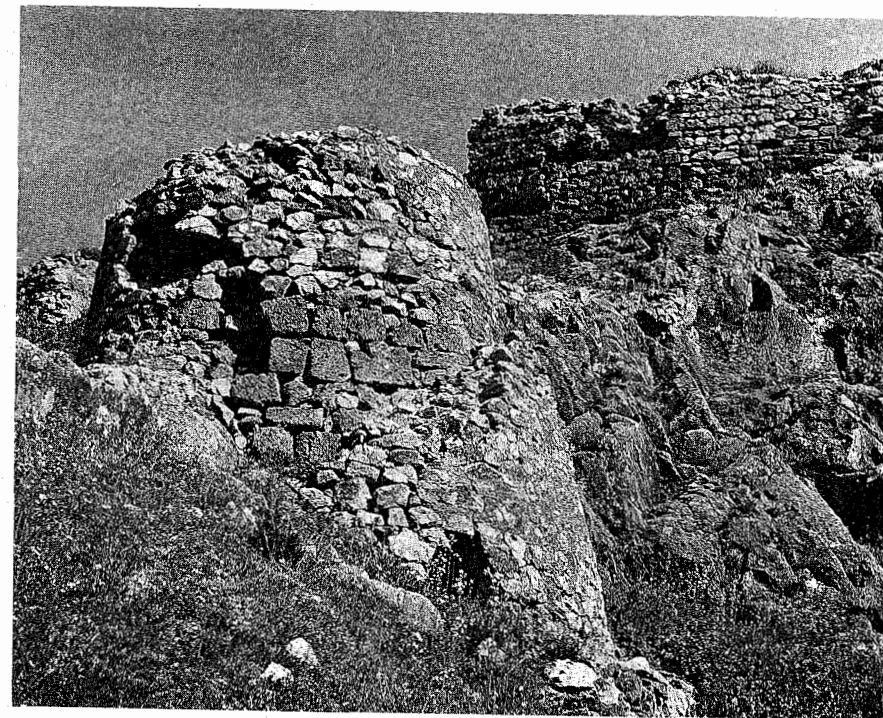
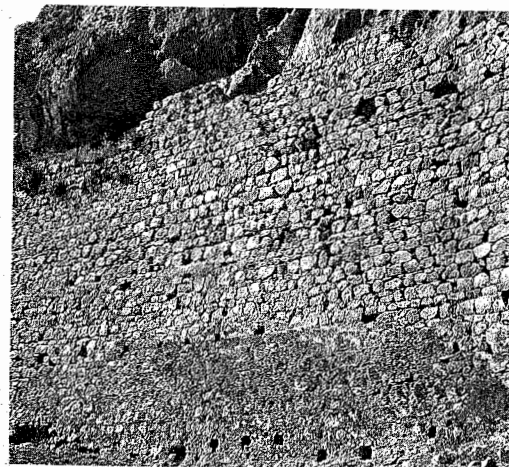


Fig. 66 – Tokat: two or perhaps three
periods of masonry in the
cistern tower of the citadel

Fig. 67 – Tokat: Byzantine masonry type 4

Fig. 68 – Tokat: Byzantine masonry type 3



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Fig. 69 – Niksar: the Mithridatic and Byzantine hill site

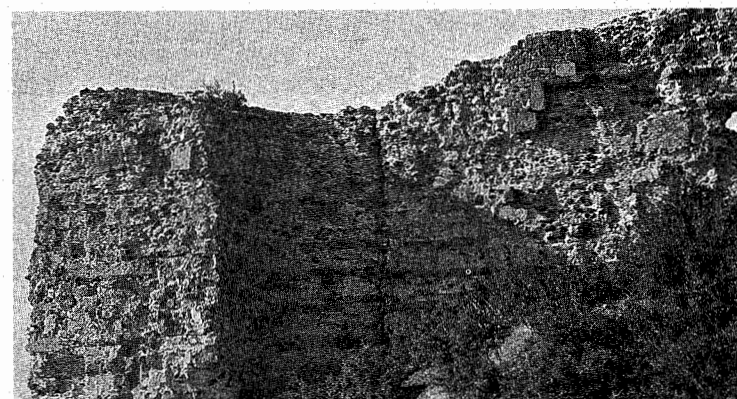
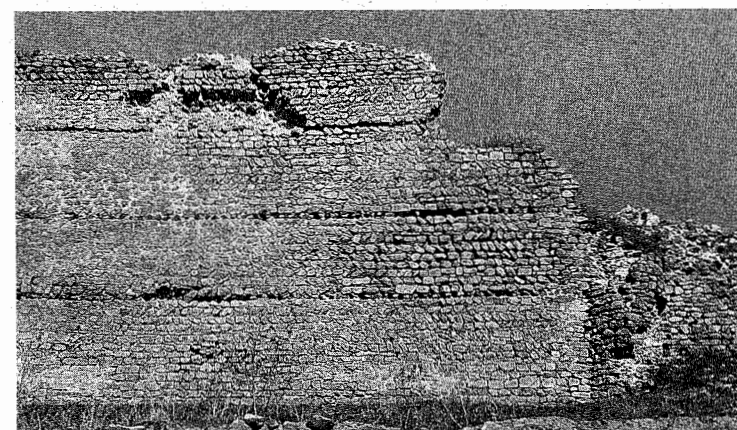


Fig. 70 – Niksar: Byzantine citadel wall

Fig. 71 – Niksar: inner citadel: herringbone masonry with timber tie beams



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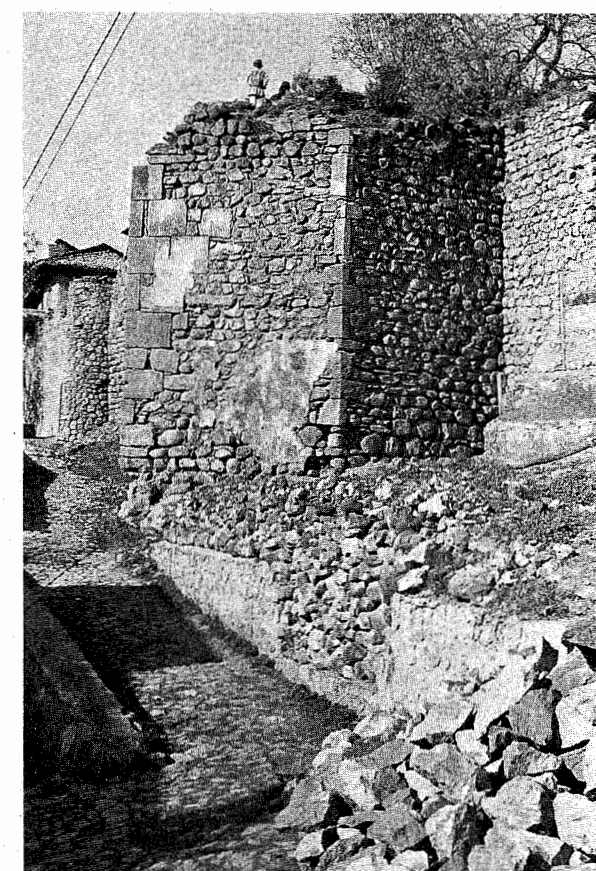


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Fig. 72 – Niksar: Byzantine wall between inner citadel and inner citadel bailey

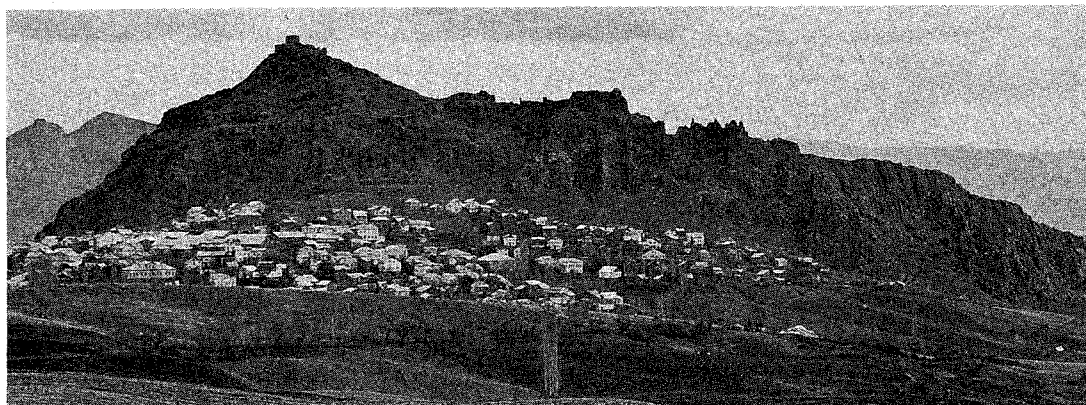
Fig. 73 – Niksar: detail of Fig. 72 with evidence of cribwork on the left and ashlar quoins, now robbed away, on the right

Fig. 74 – Niksar: Byzantine prow tower in the town wall

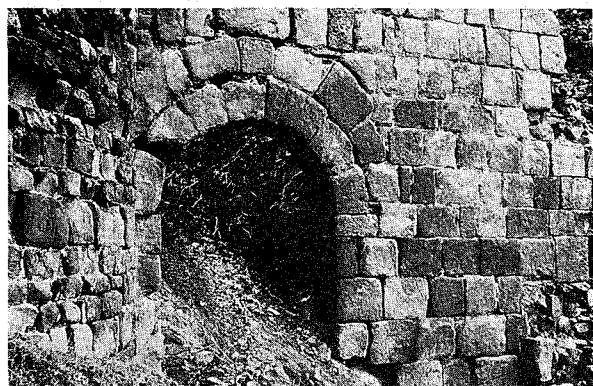


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Fig. 75 — Şebinkarahisar:
general view

Fig. 76 — Şebinkarahisar:
gate, possibly of sixth century

Fig. 77 — Şebinkarahisar,
Byzantine walling by lower gate;
note evidence of tie beams,
and Ottoman refacing of gate

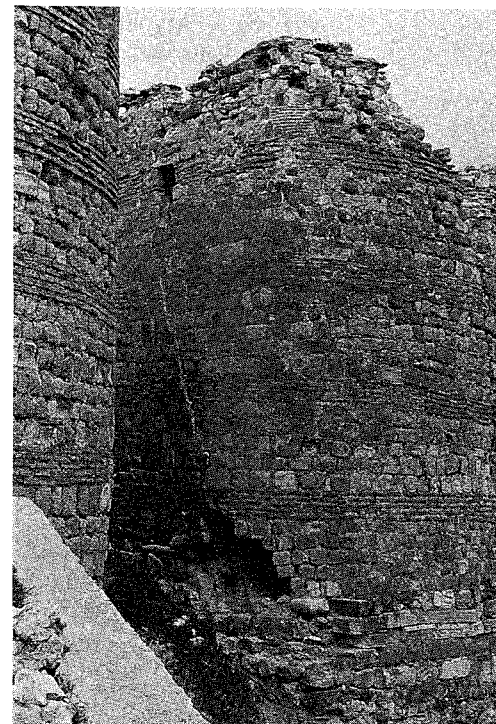


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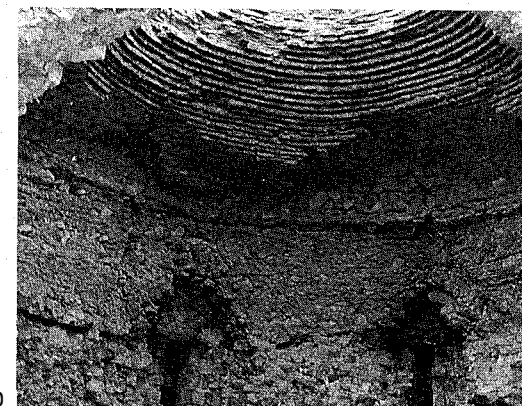
Fig. 78 — Kütahya, general view



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Fig. 79 — Kütahya:
close set round towers on plinths,
with brick bands

Fig. 80 — Kütahya:
interior of round tower
with dome of brick



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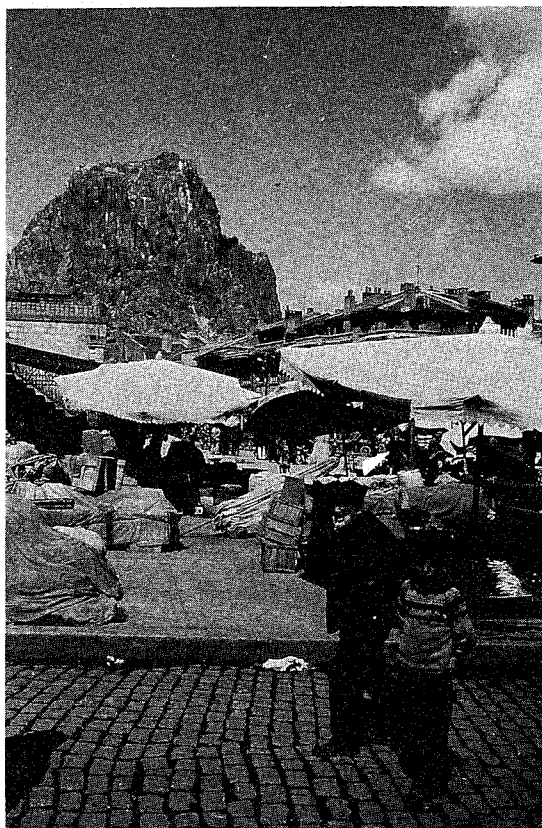


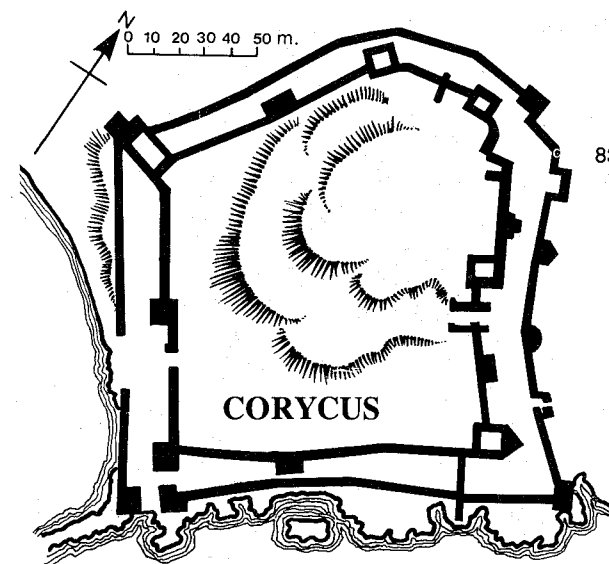
Fig. 81 – Afyonkarahisar:
general view of the citadel
on top of the rock

Fig. 82 – Afyonkarahisar:
citadel walls with cribwork



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Fig. 83 – Plan of Corycus; note
prow tower in northeastern wall

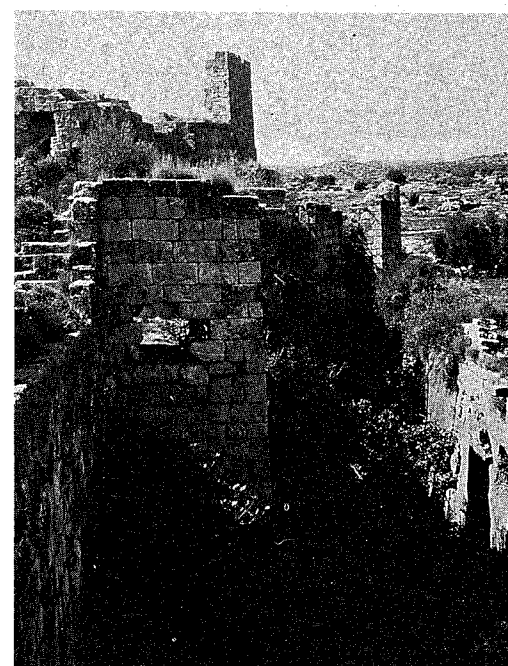
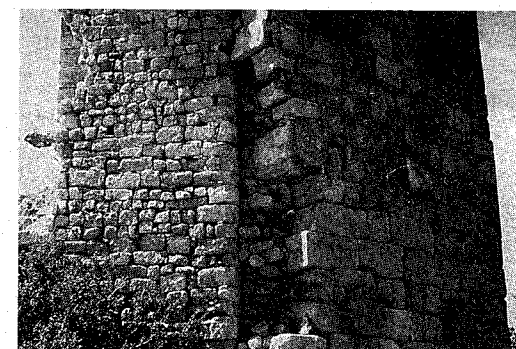


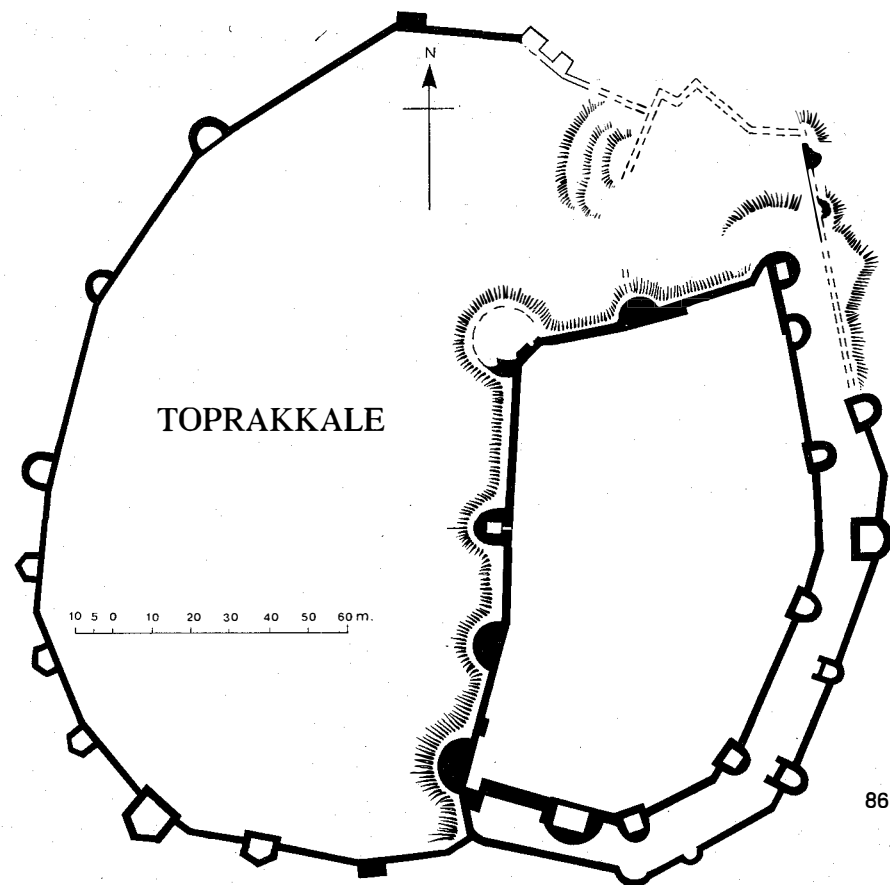
Fig. 84 – Corycus:
east walls with ditch

Fig. 85 – Corycus: pentagonal
prow tower with reused classical
masonry including columns used
as headers, and secondary repairs
in smaller masonry



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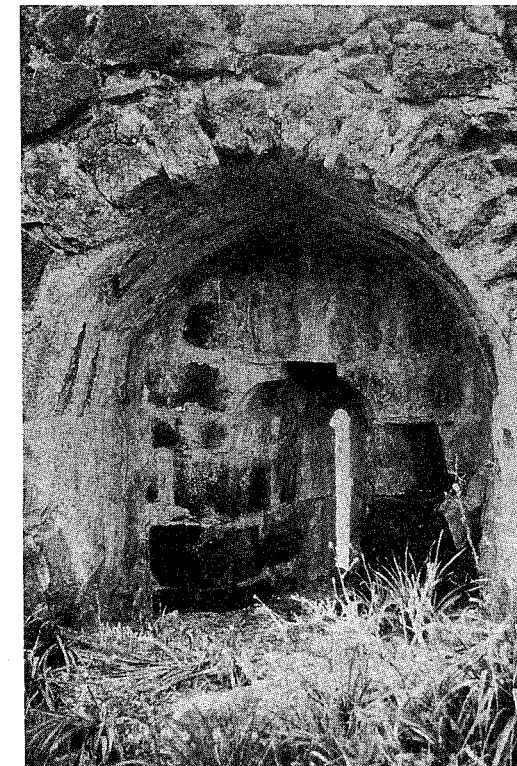


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Fig. 86 – Plan of Toprakkale; note pentagonal prow towers in lower west wall

Fig. 87 – Toprakkale: general view; note pentagonal towers in lower wall

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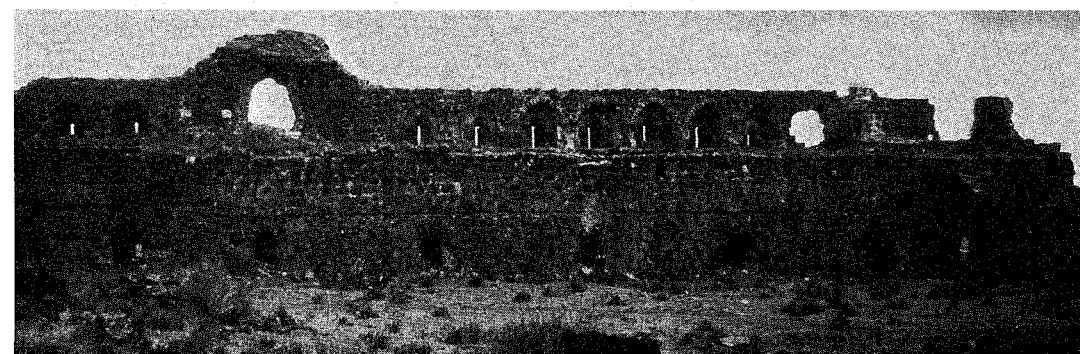


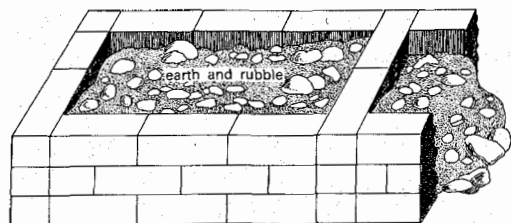
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Fig. 88 – Toprakkale: citadel tower with pebble dash

Fig. 89 – Toprakkale: interior of citadel with round arched loopholes

Fig. 90 – Toprakkale: loophole with corbelled arch

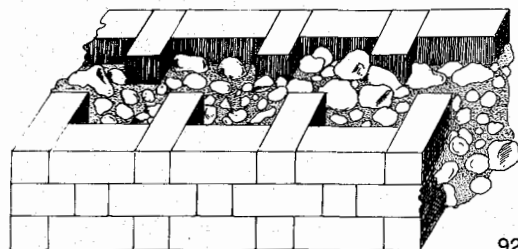




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Fig. 91 - Hellenistic system of casemate walling

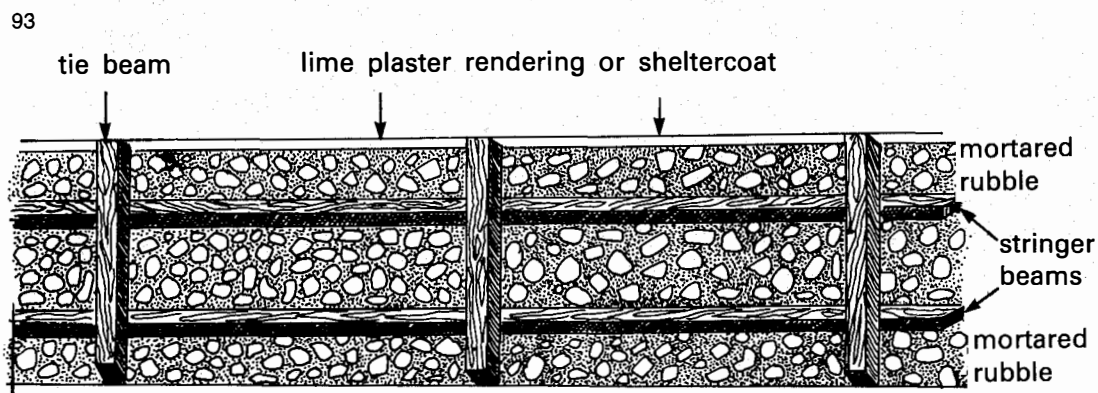
Fig. 92 - Walling with facing of ashlar headers and stretchers and mortared rubble core



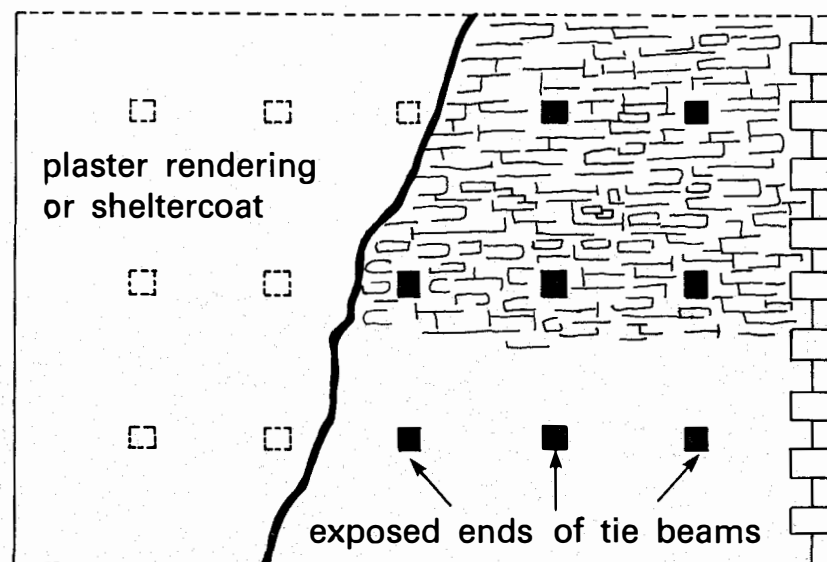
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Fig. 93 - Cribwork: Cross-section of a mortared rubble wall

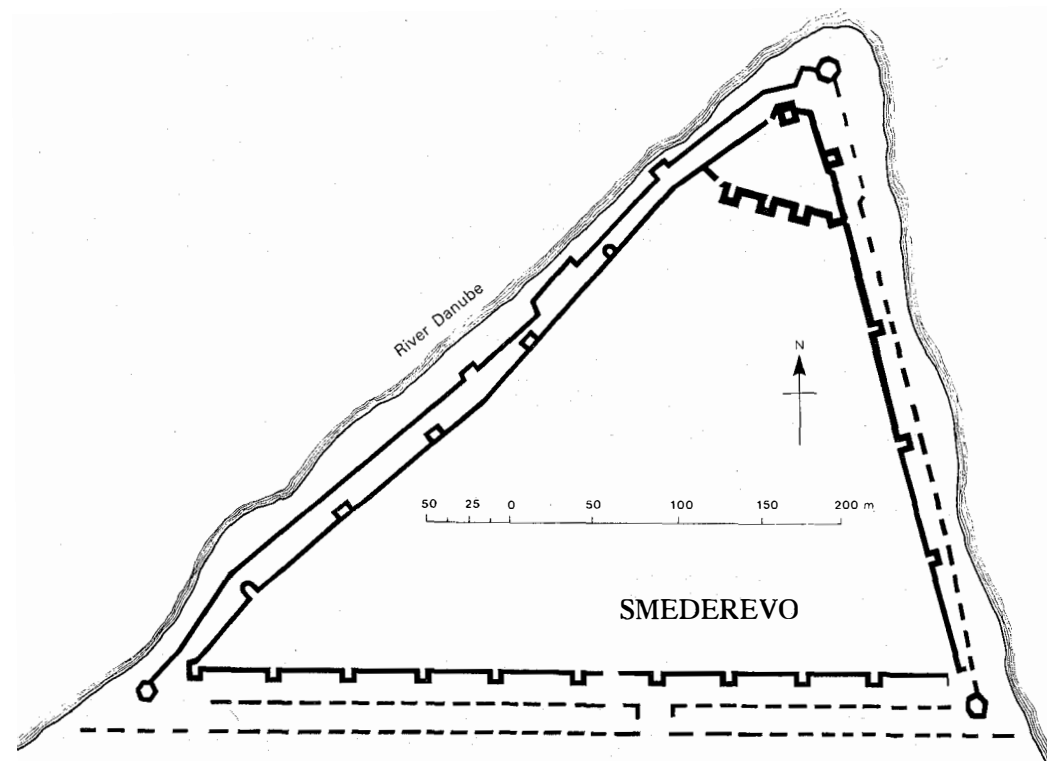
Fig. 94 - Mortared rubble wall with beam holes indicating bonding courses of cribwork



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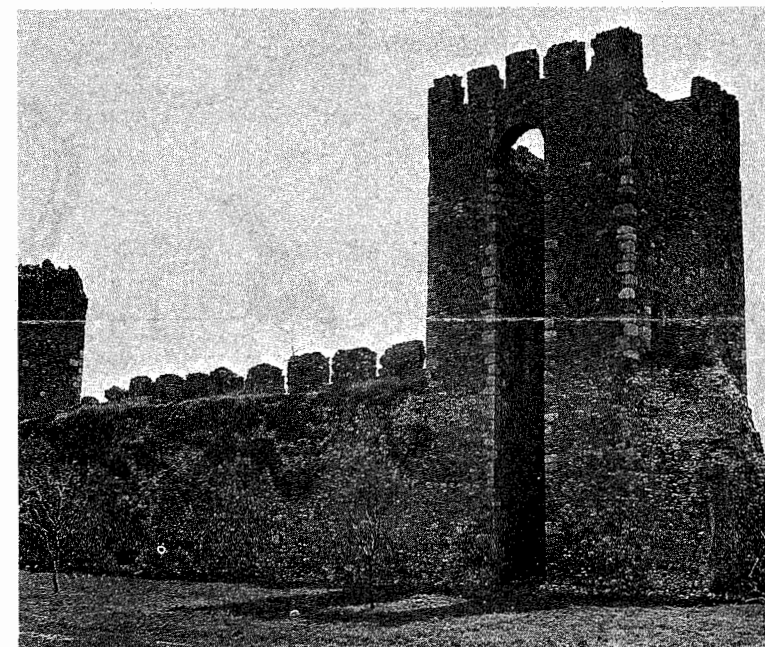


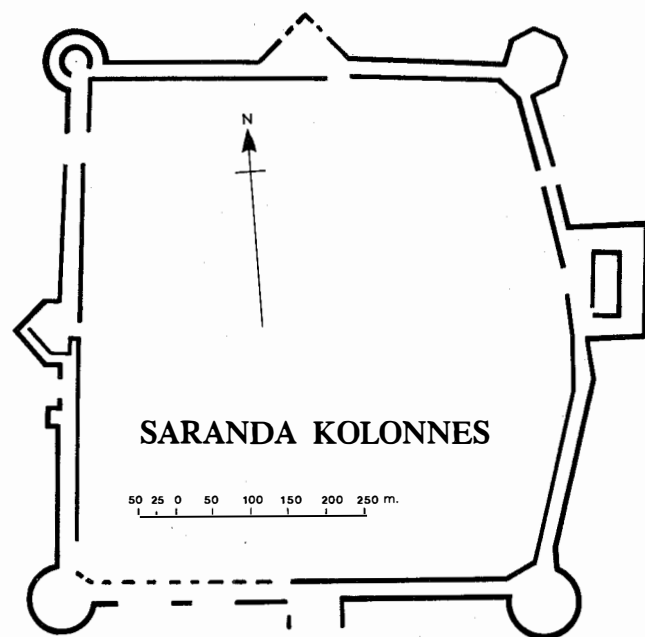
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Fig. 95 - Plan of Smederevo

Fig. 96 - Smederevo: open gorge tower

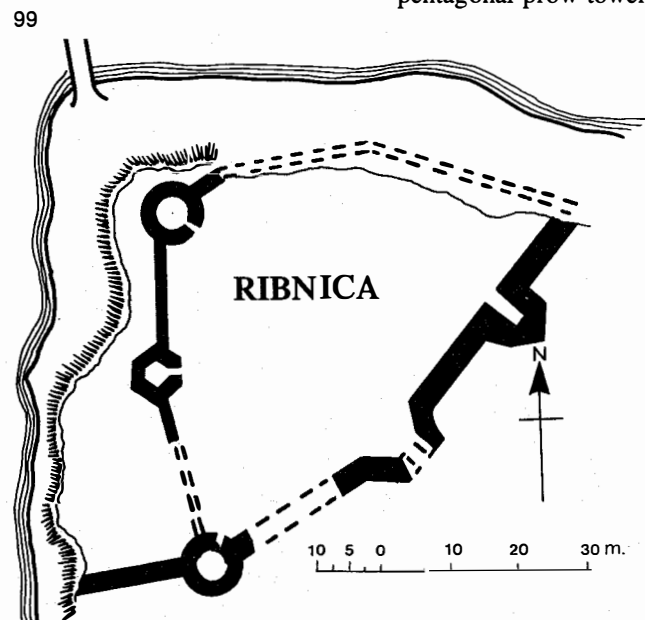




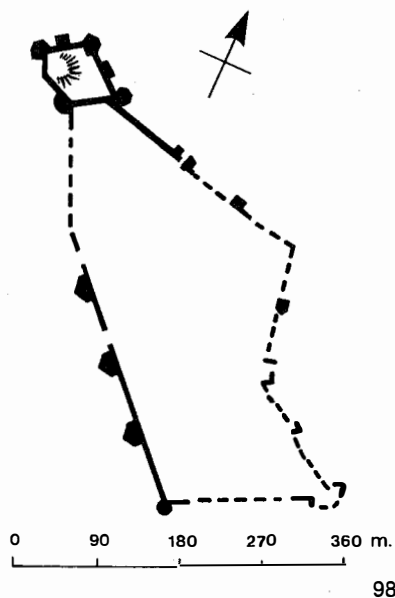
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Fig. 97 – Plan of Saranda Kolonnes showing pentagonal prow tower

Fig. 99 – Plan of Ribnica showing pentagonal prow tower



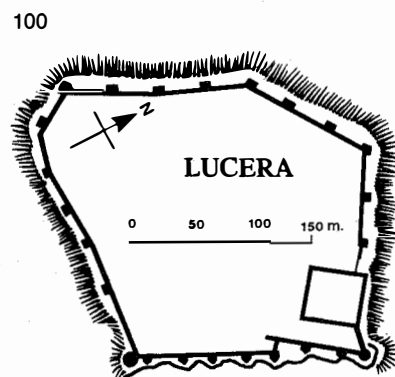
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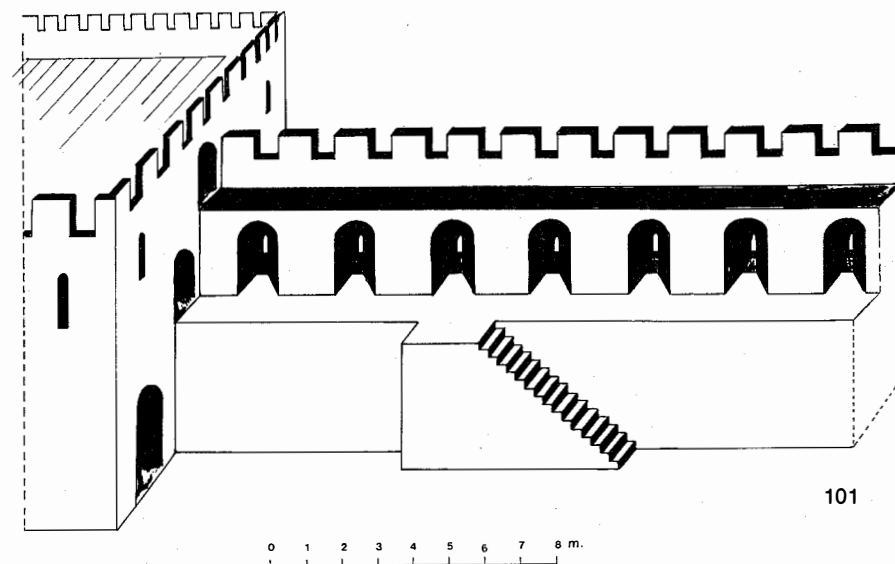
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Fig. 98 – Plan of Durazzo showing pentagonal prow towers

Fig. 100 – Plan of Lucera with pentagonal prow towers in eastern wall



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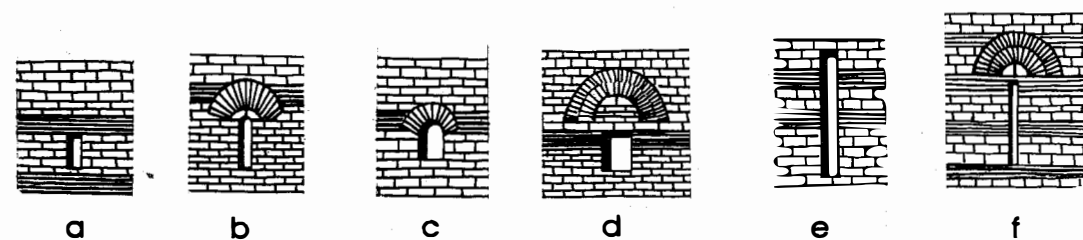
Fig. 101 – Gallery wall: restoration

Fig. 103 – Openings in Norman fortifications

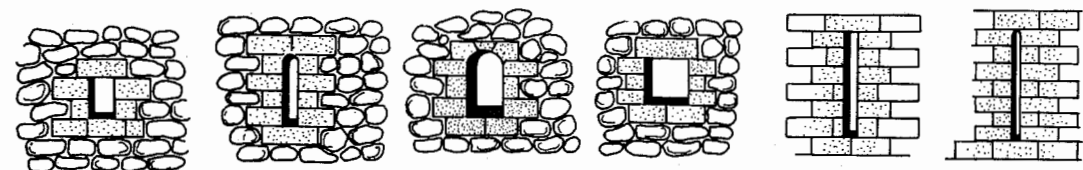
Fig. 102 – Openings in Byzantine fortifications

Fig. 104 – Development of the loophole

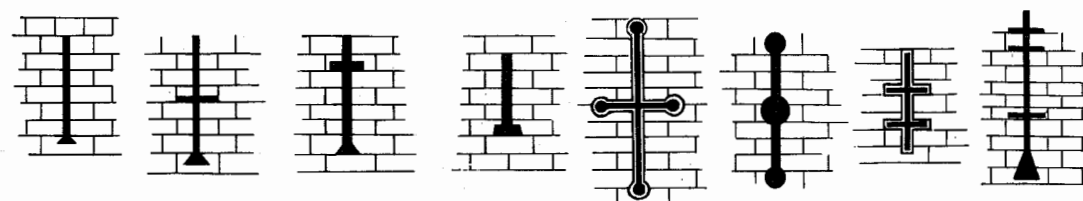
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PART TWO

Constantinople and Nicaea

CHAPTER 1

CONSTANTINOPLE

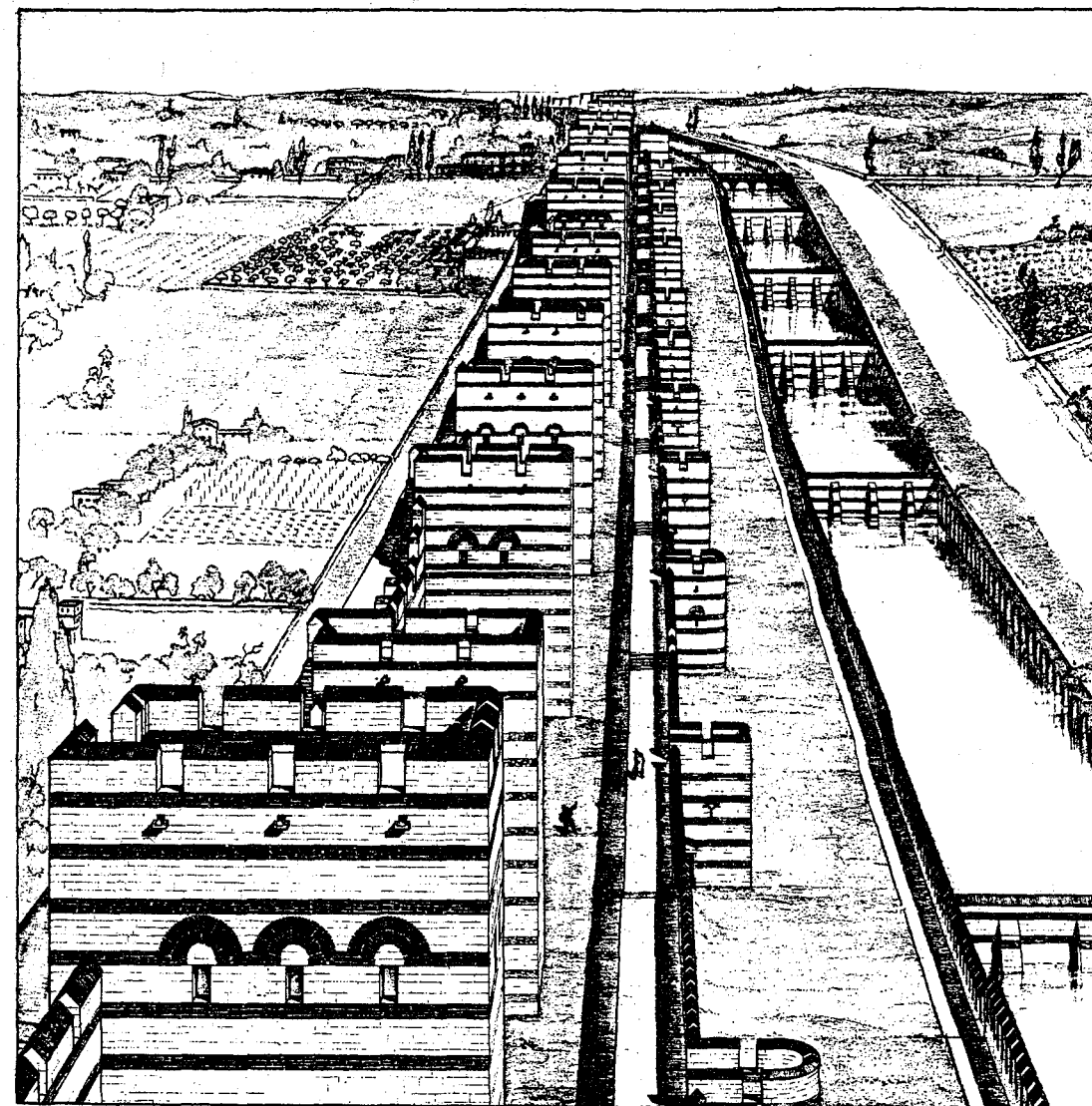
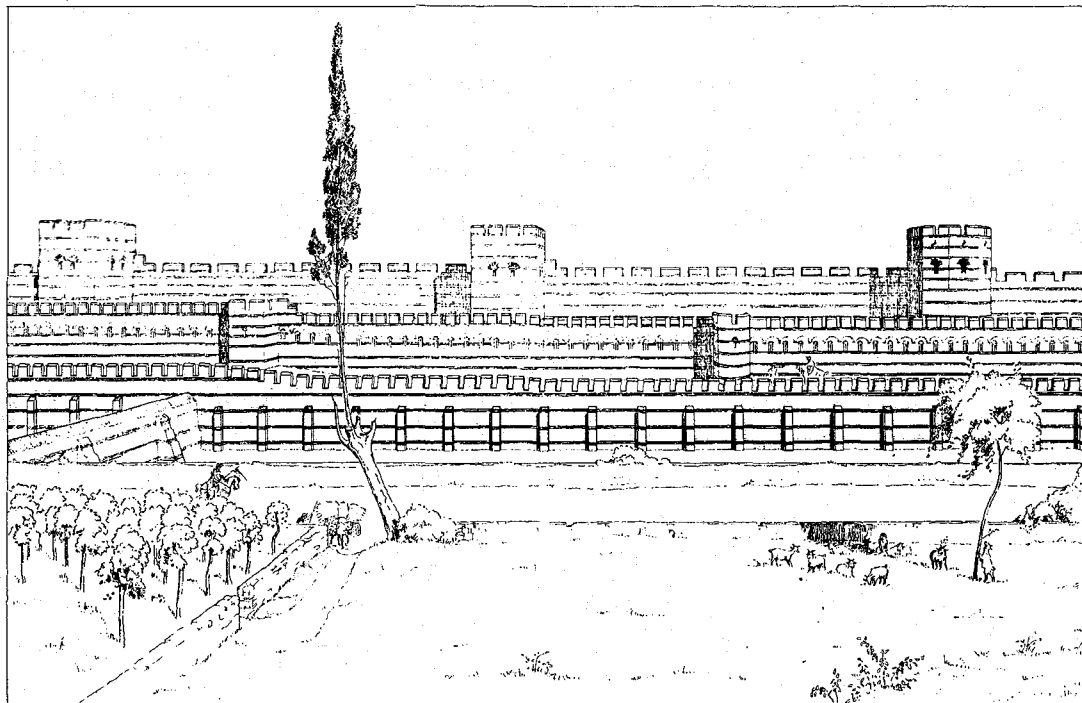


Fig. 1 – The Land Walls, restored after Meyer-Plath and Schneider

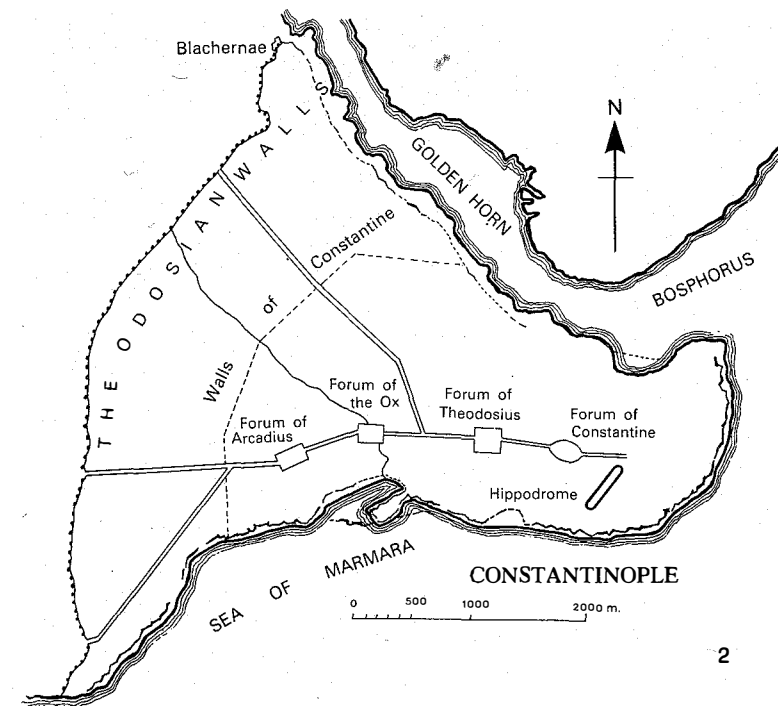


1a

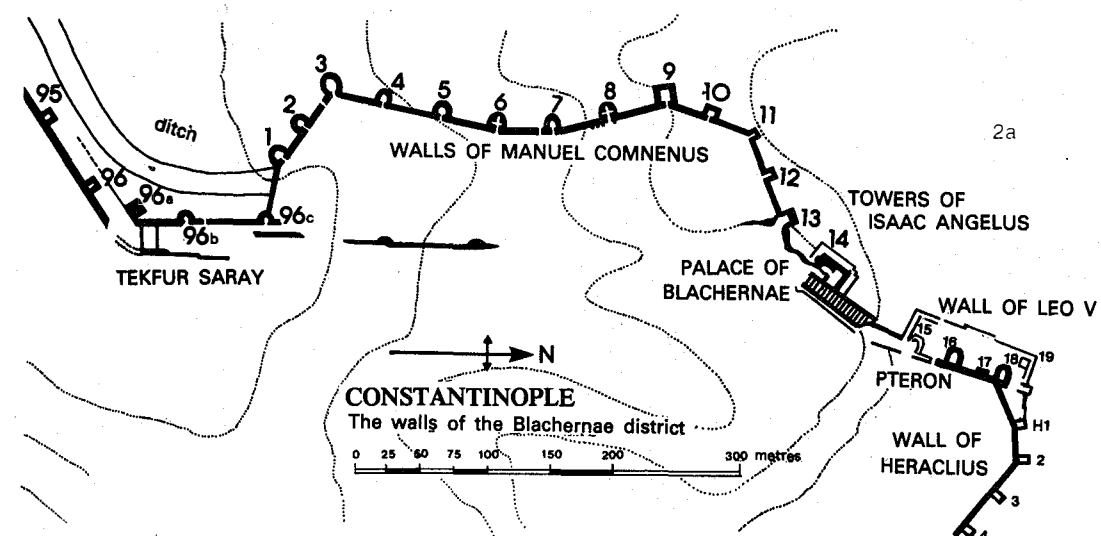
Fig. 1a – The Land Walls, facing view, restored after Meyer-Plath and Schneider

Fig. 2 – Constantinople, general plan

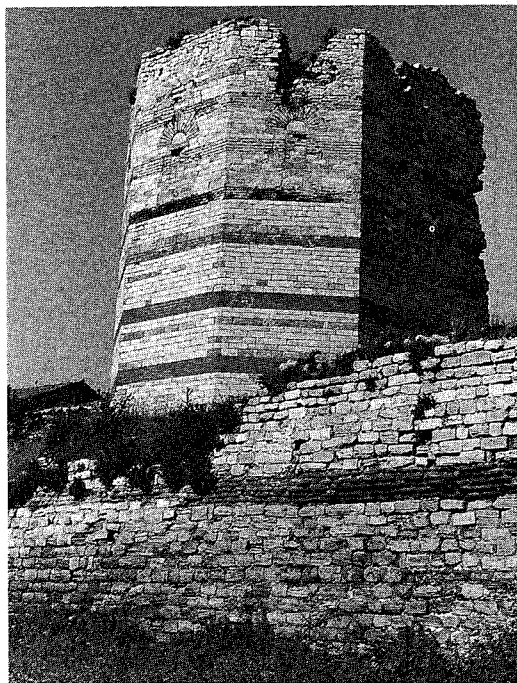
Fig. 2a – Walls of the Blachernae, after Meyer-Plath and Schneider



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2a



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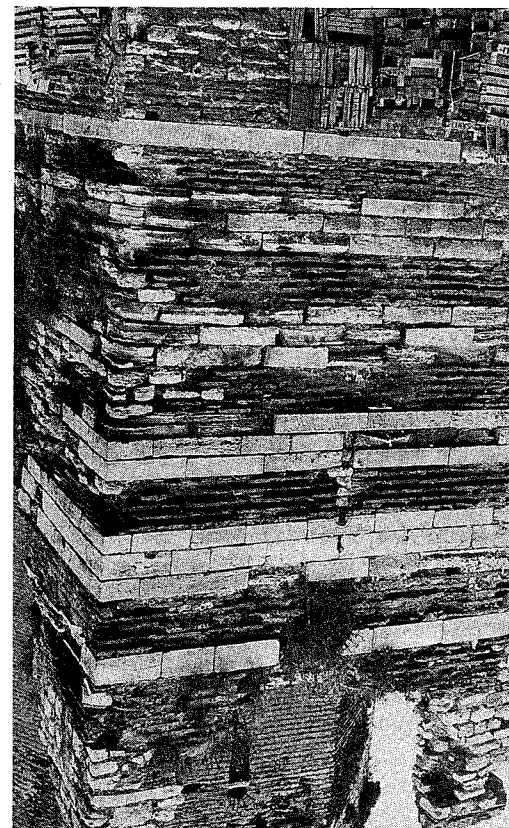
Fig. 3 – T46 of Theodosius II, restored by Artemius c715; in the foreground, the outer walls

Fig. 4 – T25 of Leo III, c740; outer wall in foreground

Fig. 5 – T45 of Leo IV and Constantine VI, 775–780



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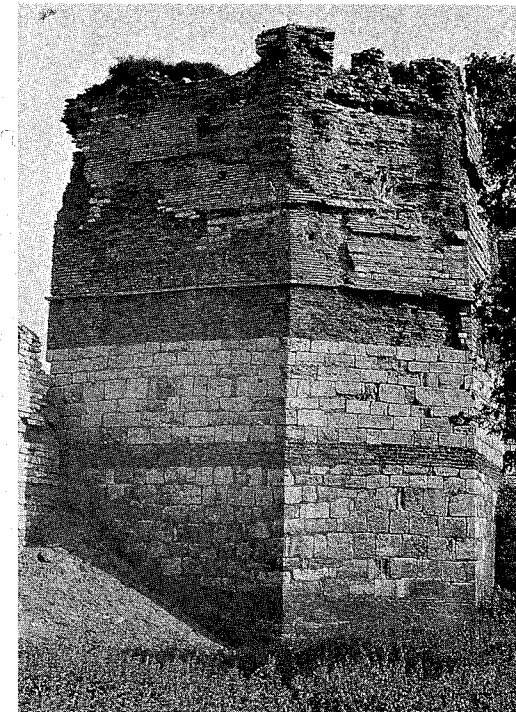


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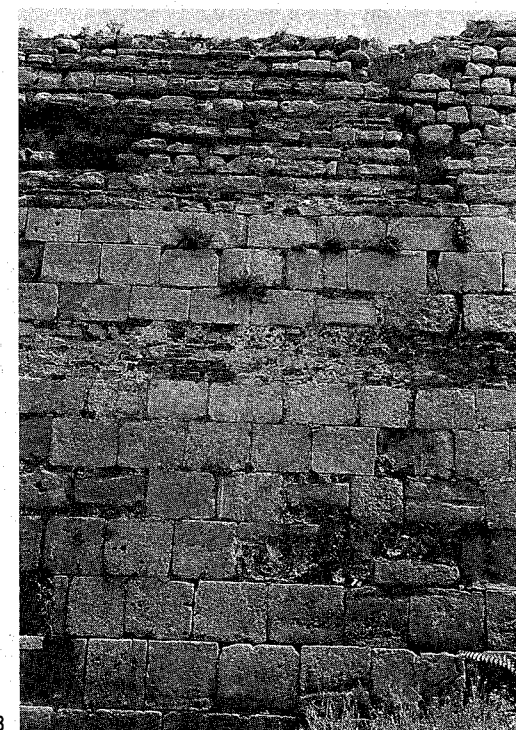
Fig. 6 – Bastion of Michael II, added in 821 to the wall of Leo V

Fig. 7 – Tower B16 of Theophilus, 829–842, with later repairs

Fig. 8 – W85/86 near Gate of Adrianople, built by Theophilus in 827; above, superstructure of Alexius III, 1197



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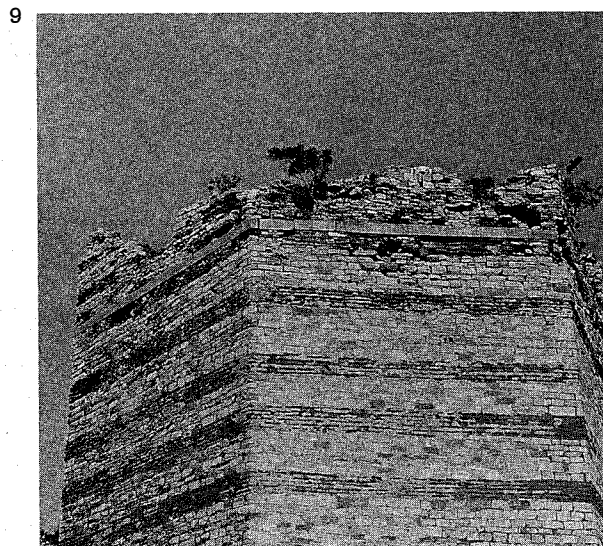
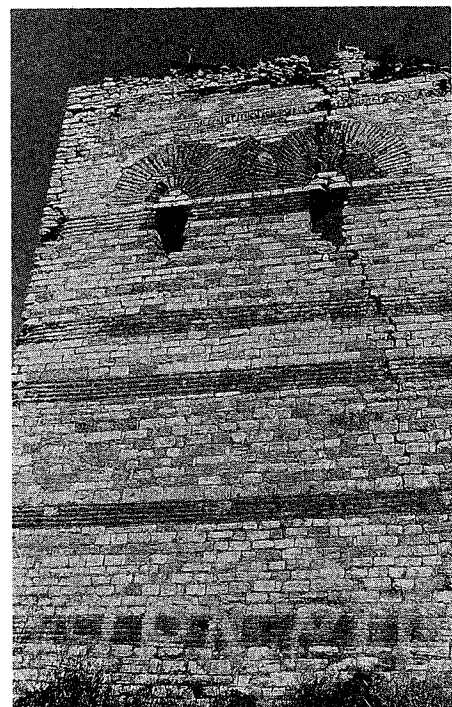
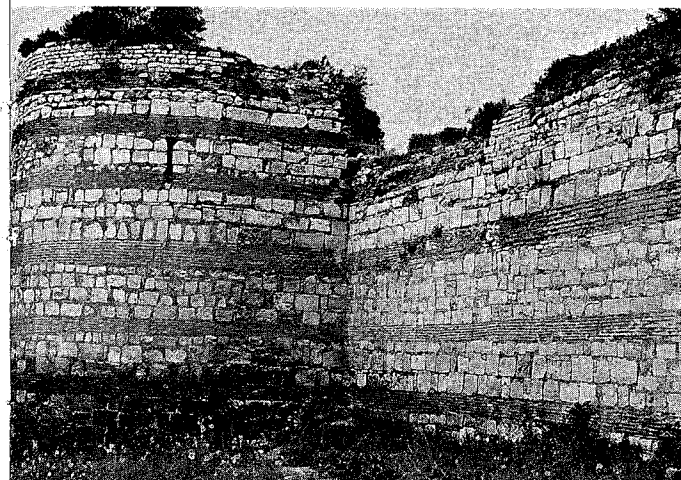
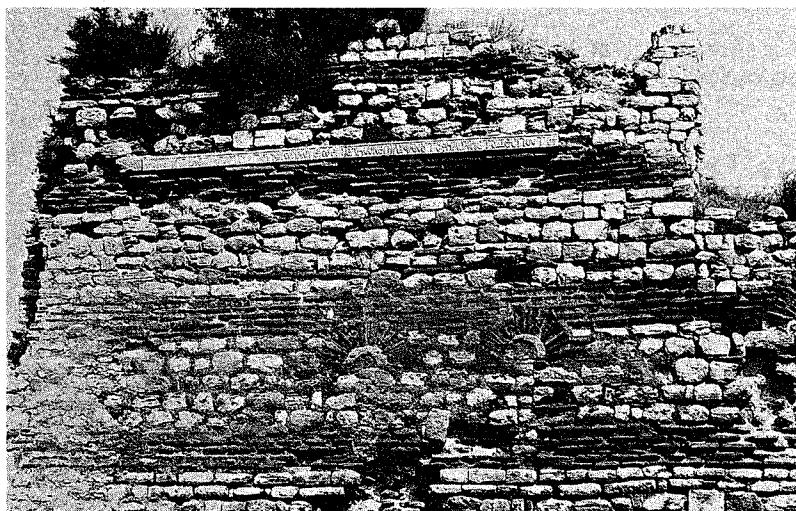


Fig. 9 – Upper part of T1
with inscription of Basil I, 868–877

Fig. 10 – T57 of Constantine
Porphyrogenitus, 945–959

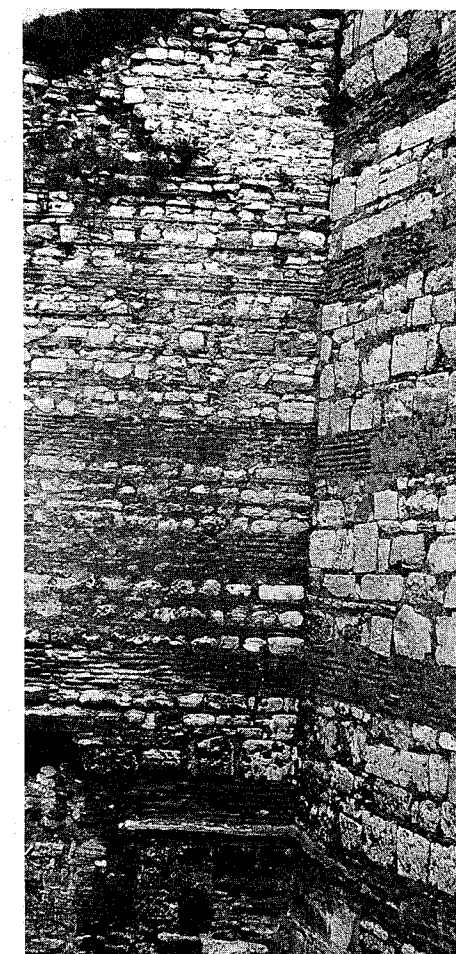
Fig. 11 – Tower B19 added to the wall
of Leo V by Romanus III, 1028–1034



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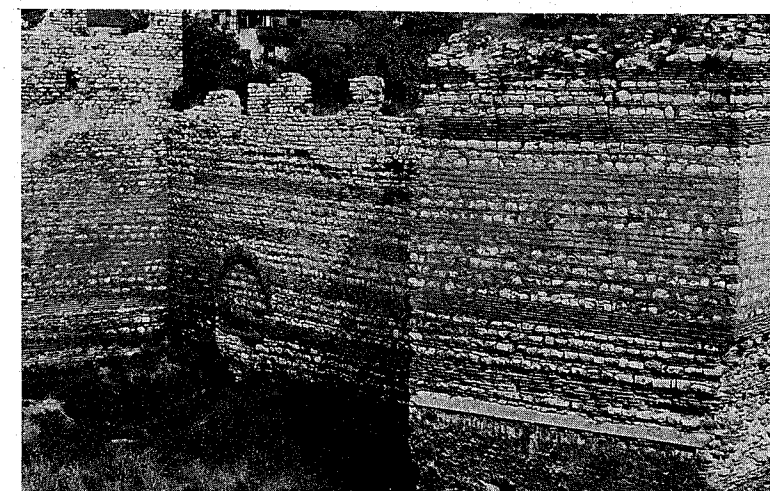
Fig. 12 – Southern part of wall
of Manuel Comnenus, c1160/1180;
tower B5 with adjacent wall

Fig. 13 – Joint between two sections
of wall of Manuel Comnenus
at tower B9



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Fig. 14 – Northern part of wall
of Manuel Comnenus,
c1160/1180; towers B11, B12



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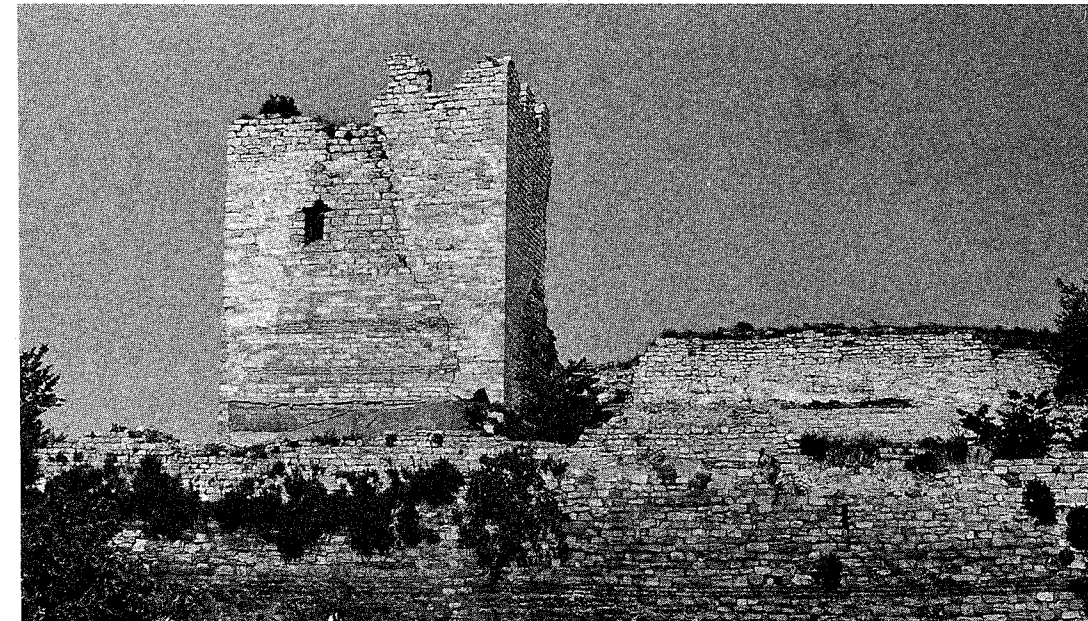
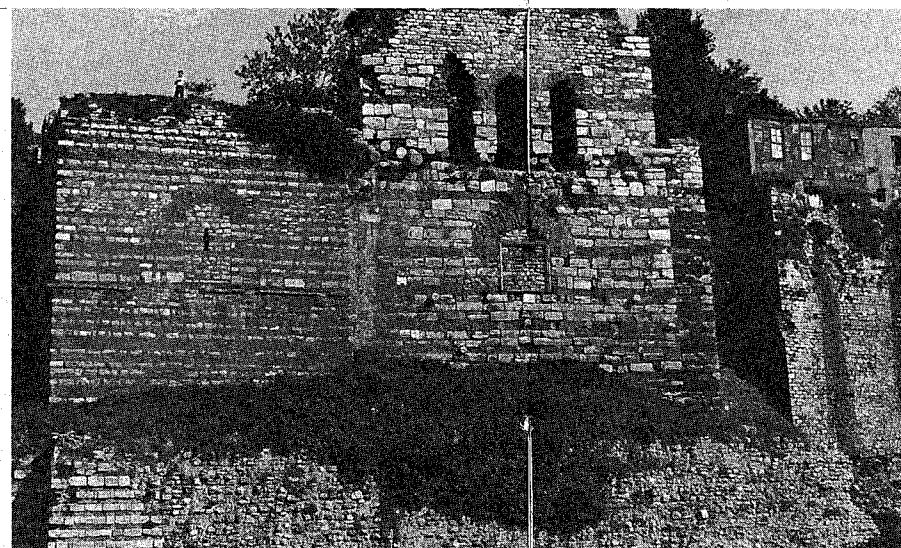
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Fig. 15 – Tower B13 of Isaac Angelus, 1185–1195; on the right, W12/13 rebuilt by John Palaeologus in 1441

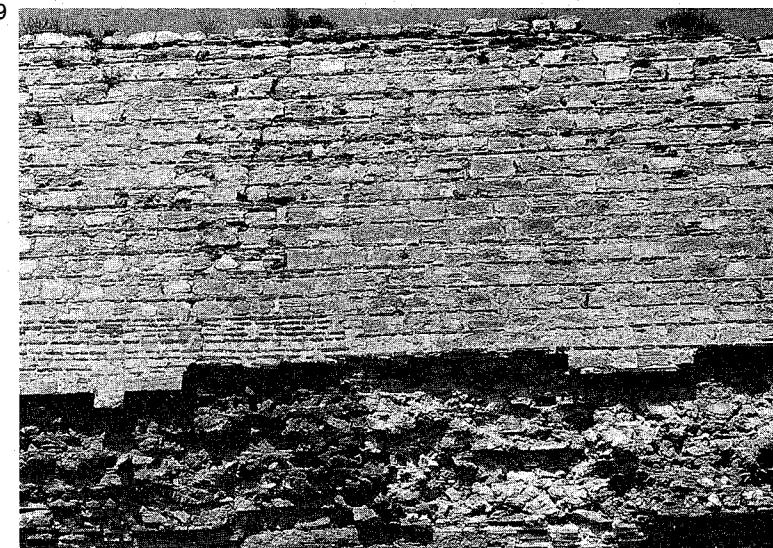
Fig. 16 – Residential tower B14: right half of Isaac Angelus, 1185–1195; left addition Palaeologan, c1261/1282

Fig. 17 – T35 with inscription of John Palaeologus, 1438



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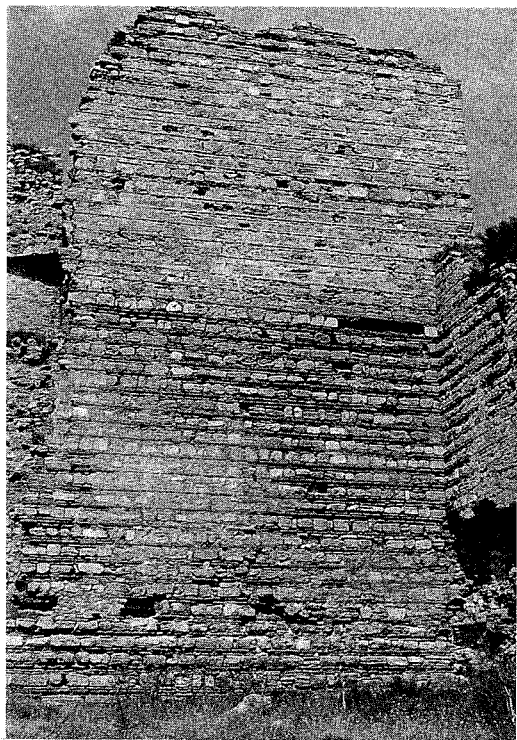
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Fig. 18 – T33, with irregular cloisonné [M1], XIV/XV century, as repair to banded masonry [C9], XII c.(?); outer wall in foreground

Fig. 19 – W41/43 in alternating brick [J2]



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Fig. 20 – T59,
south face; alternating
brick [J2]

Fig. 21 – T59,
interior, alternating
brick [J2] unweathered

Fig. 22 – W59/60
with desultory
cloisonné [M2],
XIV/XV c.(?)

Fig. 23 – W70/71, irregular
alternating brick [J6], XIV/XV c.(?)

Fig. 24 – W73/74,
alternating brick [J3], XII c.(?)

Fig. 25 – W79/80, with irregular
brick bands [M3], XIV/XV c.



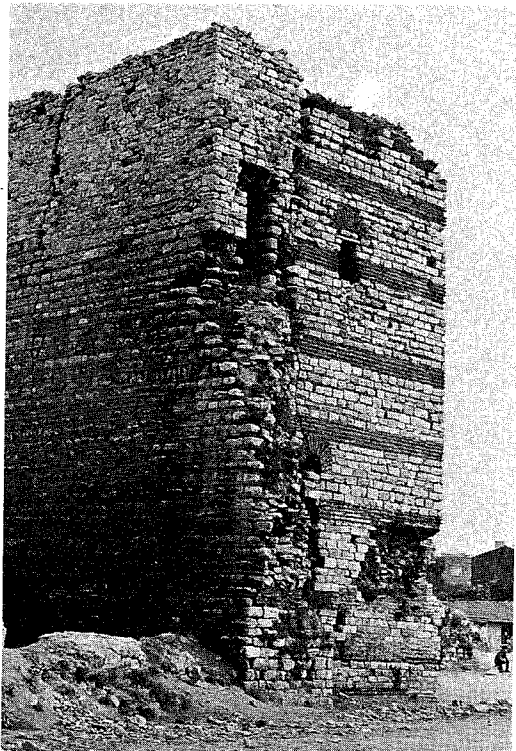
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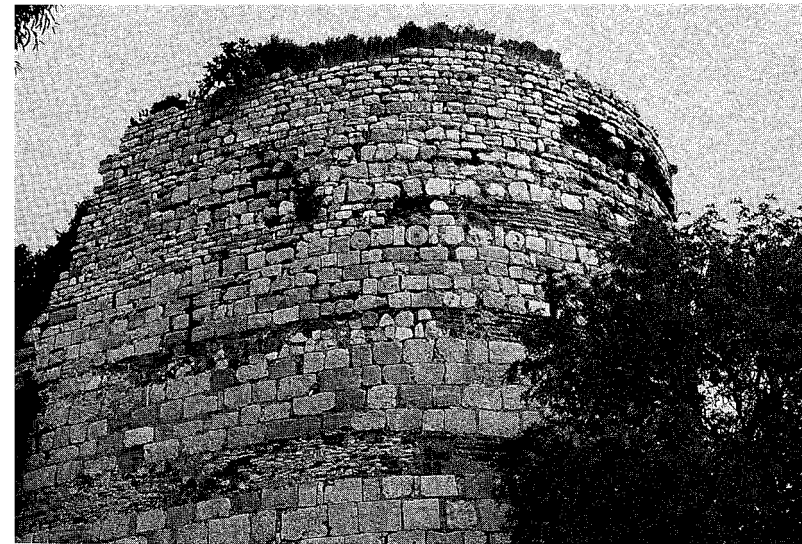
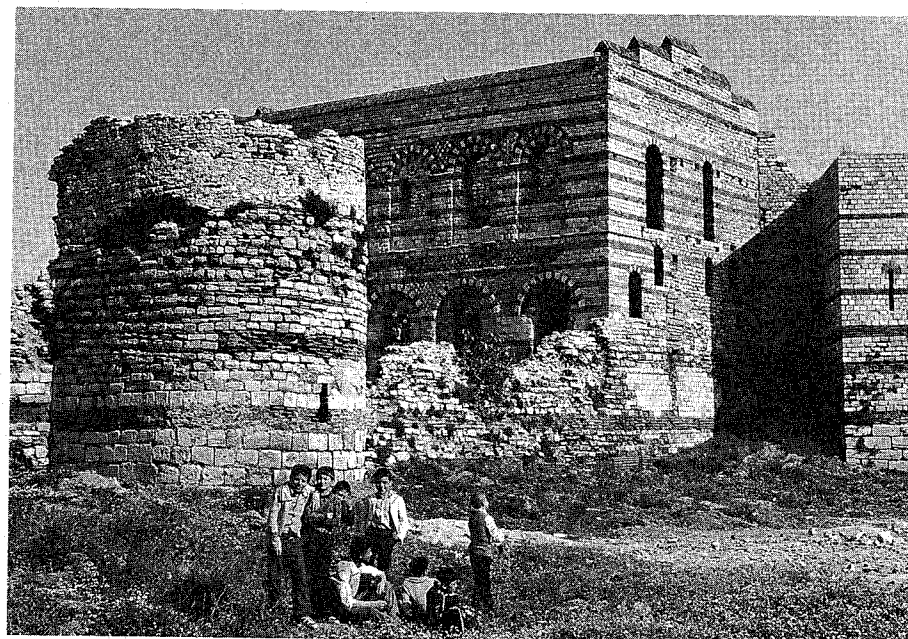


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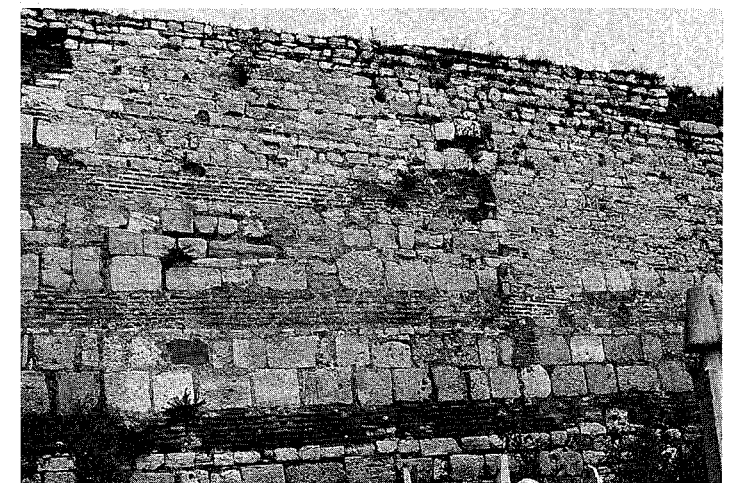
Fig. 26 – T96, north and east faces: banded masonry [C7], XI c. (?) and alternating brick [J2]

Fig. 27 – T96, south face, with detail of repair in alternating brick [J4]

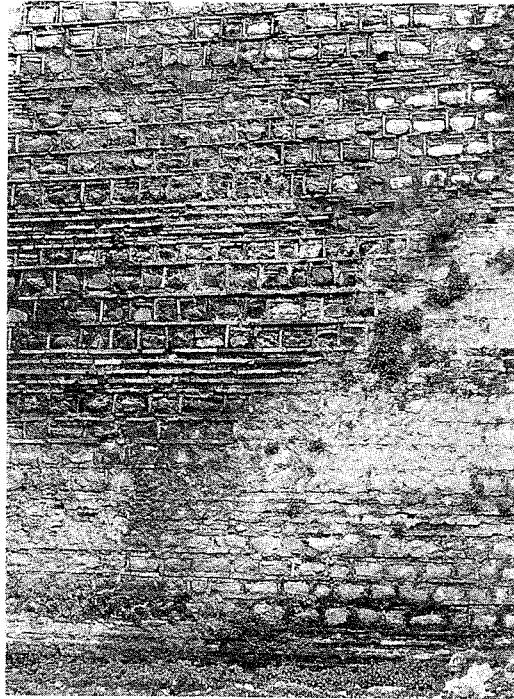
Fig. 28 – Wall of Tekfur Saray with T96b; in the background, the palace, and on the right, the heavily restored tower 96a

Fig. 29 – Tower B3 with late repairs [M4]

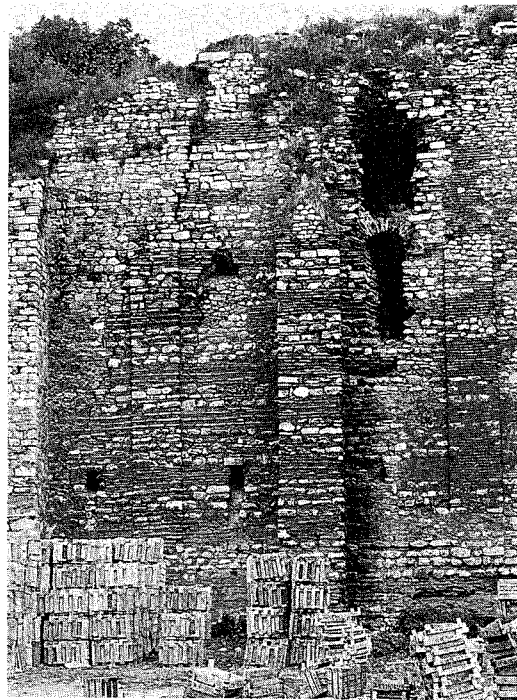
Fig. 30 – W B5/B6 with late repairs [M5]



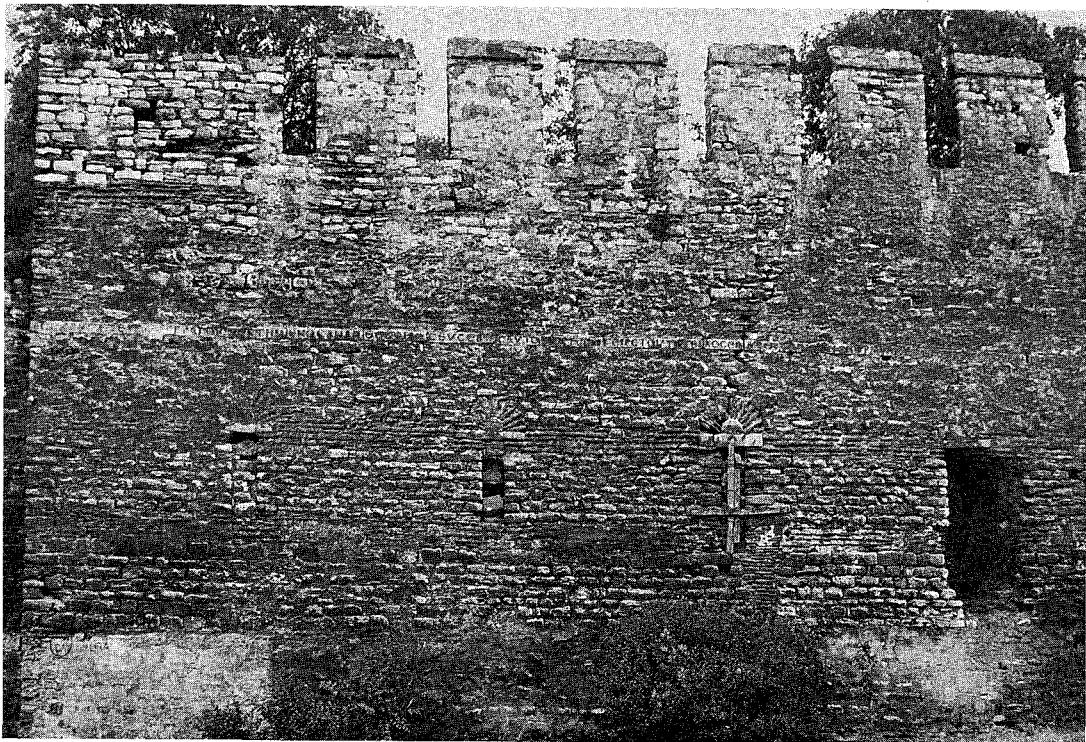
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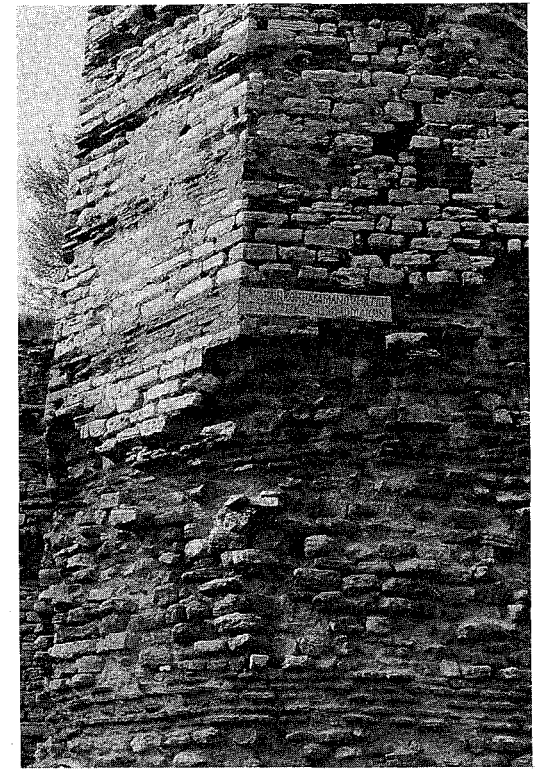
Fig. 31 — Elaborate cloisonné [I]
between towers B13 and B14, late
XII c.

Fig. 32 — Substructures of
Palace of Blachernae, outer face,
masonry [H3], XII c.

Fig. 33 — Sea walls between T4
and T5: bastion with inscription
of Theophilus [C8]

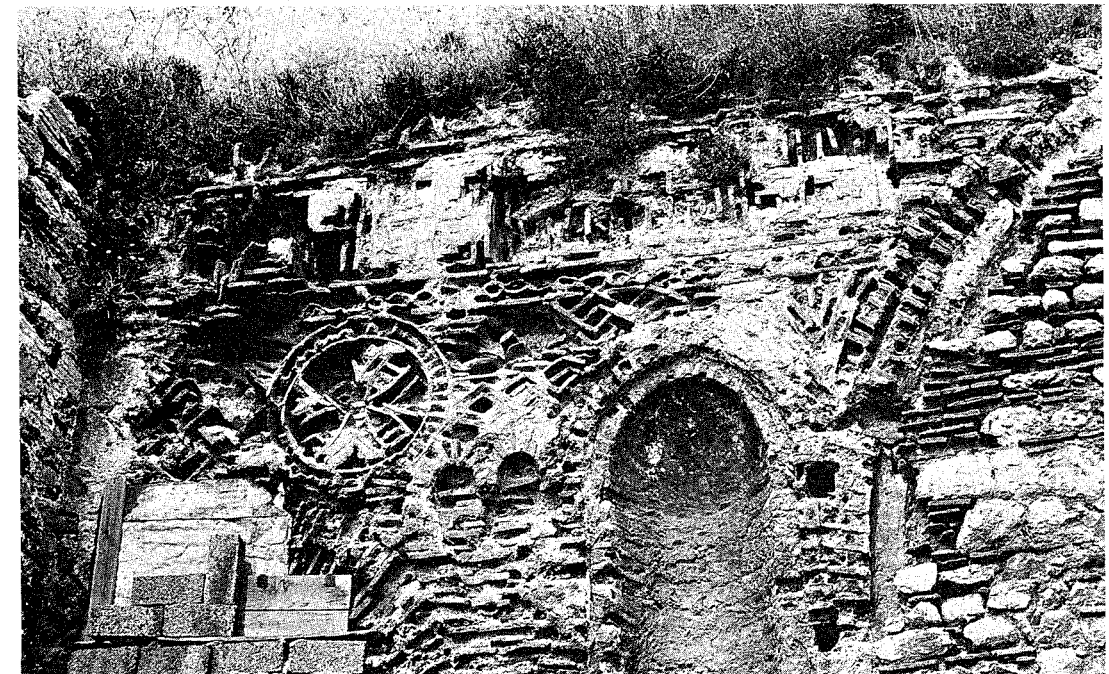
Fig. 34 — Sea walls, T93
of Manuel Comnenus, 1164 [C10]

Fig. 35 — Sea walls: facade of 1308



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CHAPTER 1

NICAEA

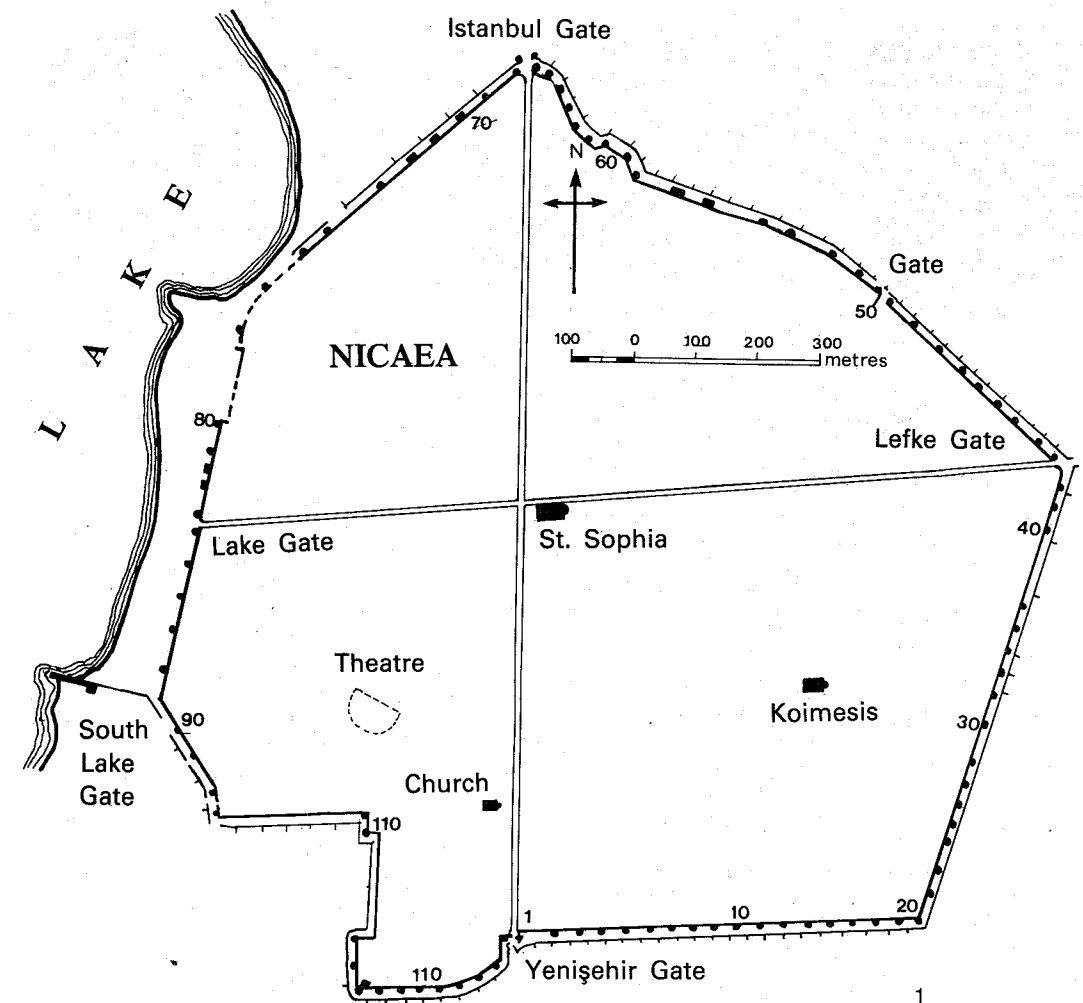


Fig. 1 – Plan of Nicaea

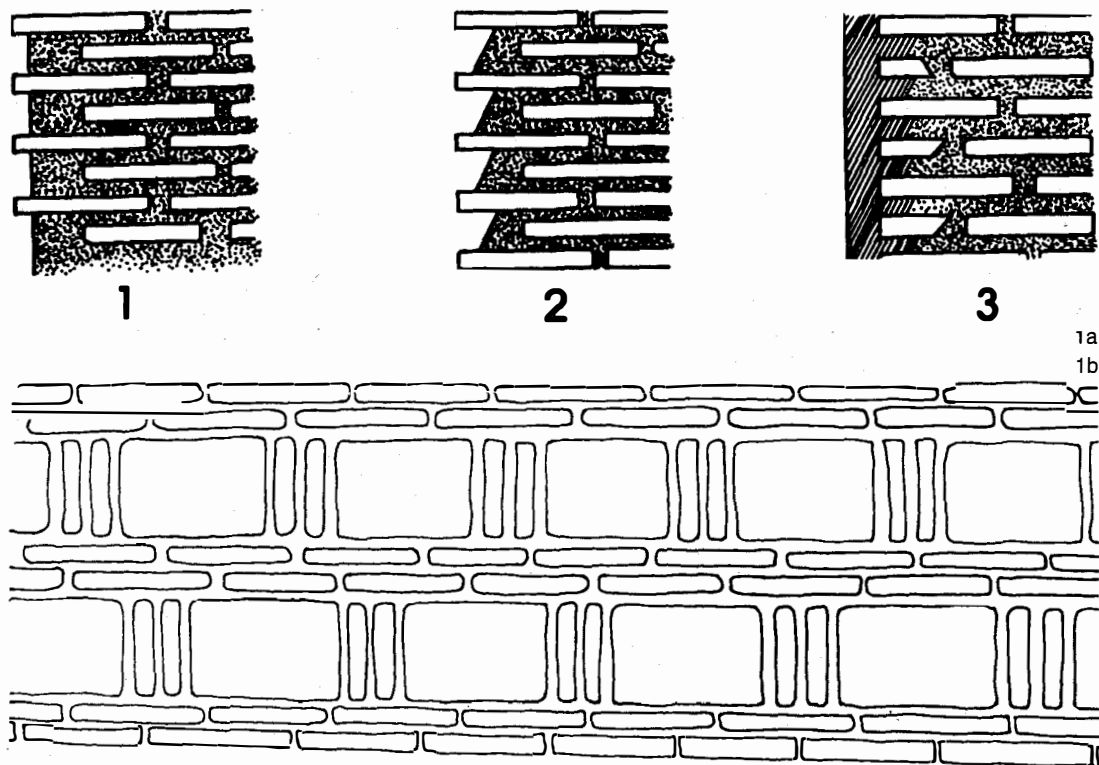


Fig. 1a – Recessed brick and chamfered mortar

1. Recessed brick. 2. Chamfered mortar.
3. Chamfered mortar with shelter coat

Fig. 1b – Cloisonné

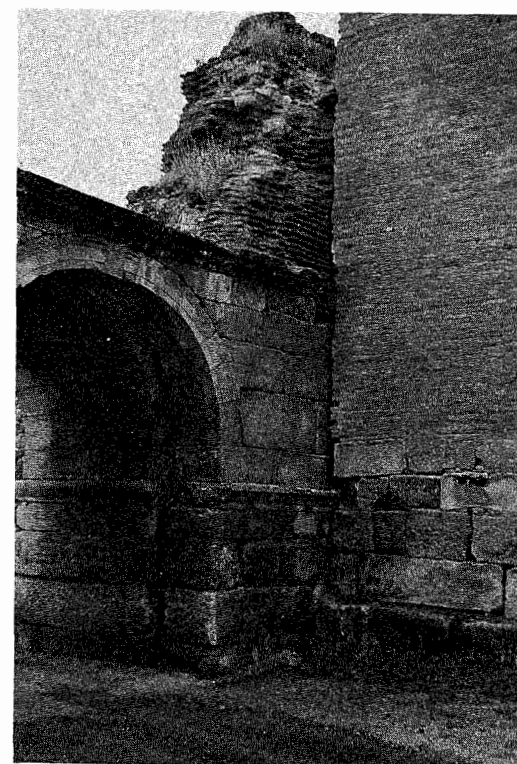
Fig. 1c – T1, with cross carved on stone of base [F6]

Fig. 2 – T1, with adjacent gate

Fig. 3 – T8, bonded to wall



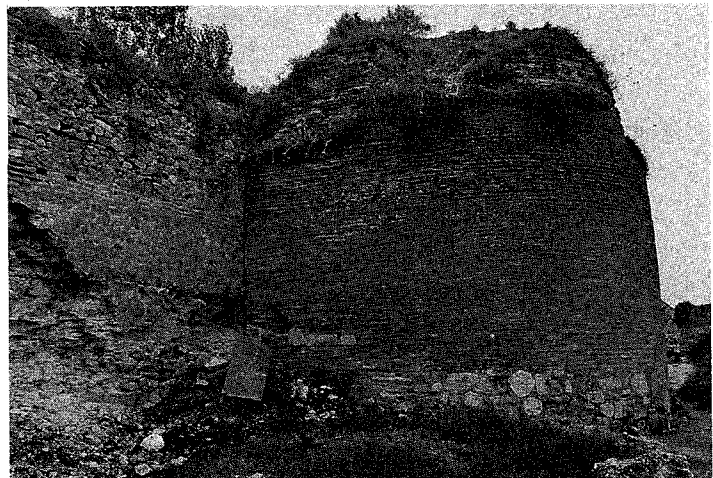
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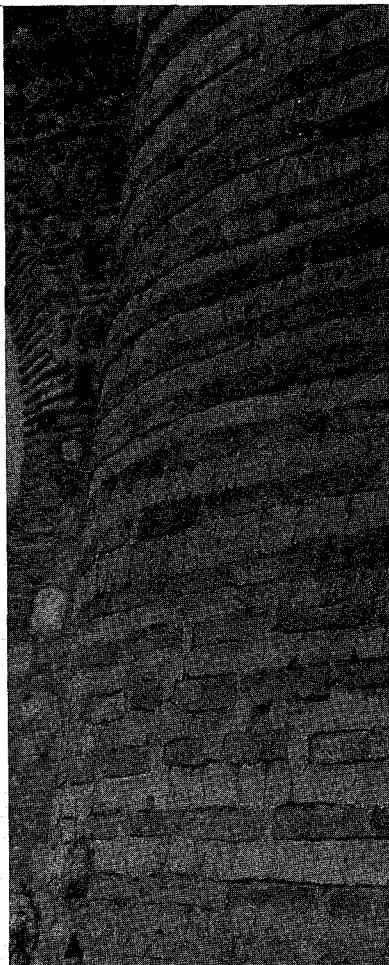


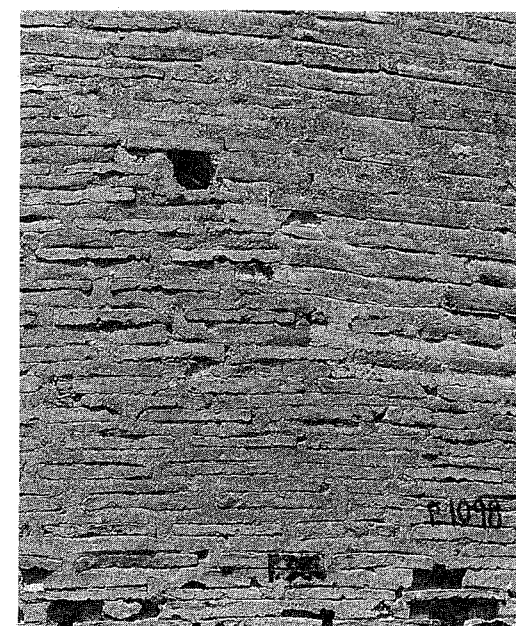
Fig. 4 – T9 with base of spoils [F7], not bonded to wall

Fig. 5 – W10/11 in crude alternating brick like [B4]

Fig. 6 – T7, detail of brickwork [A3]



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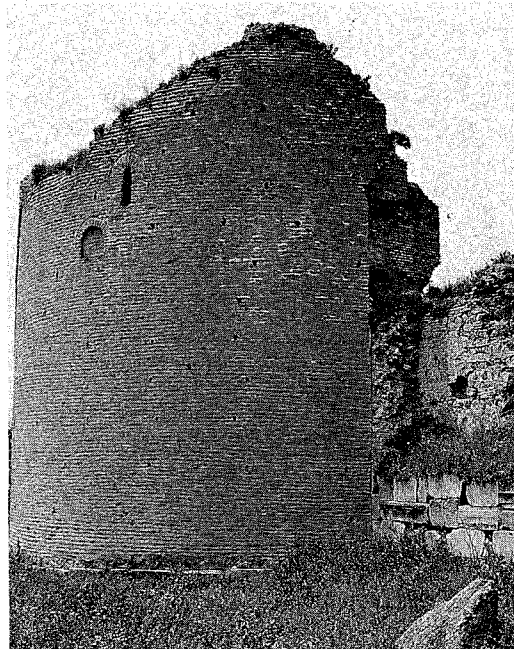
Fig. 7 – T15, detail of facing in brick [A5]

Fig. 8 – T16: brick [A1] with vertical pointing at ends of bricks, and repair in brick [A3]

Fig. 9 – T17, brick [A2] with rough coursing



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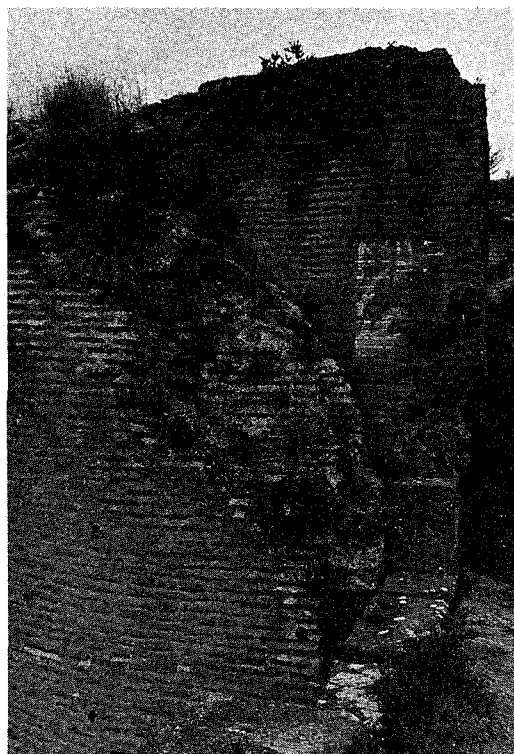


Fig. 10 – Tower 19

Fig. 11 – T20: on left, W19/20, with crude reinforcing [G] behind and above earlier base of spoils

Fig. 12 – T20, outer and inner shells, seen from wallwalk

Fig. 13 – T20, loophole of inner and outer shell

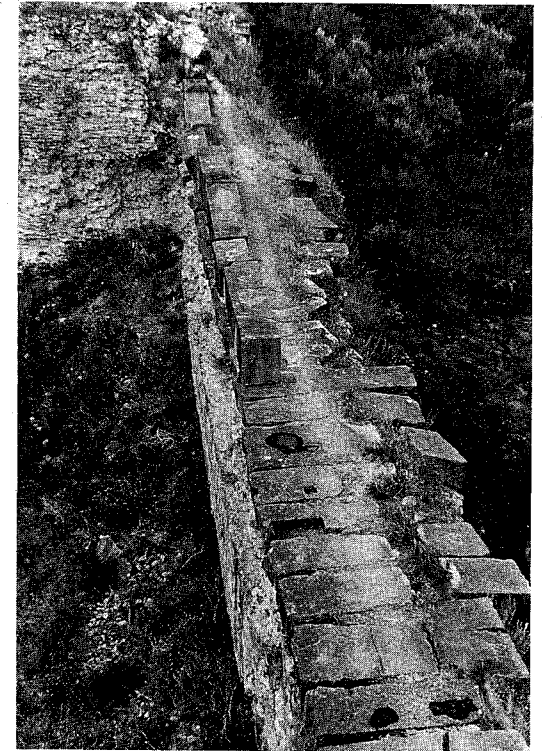
Fig. 14 – W22/23 with wallwalk and parapet of spoils

Fig. 15 – T22: recessed, but not covered, brick in embrasure corresponding with alternating brick [D3] of inside face and recessed brick [B1] of exterior



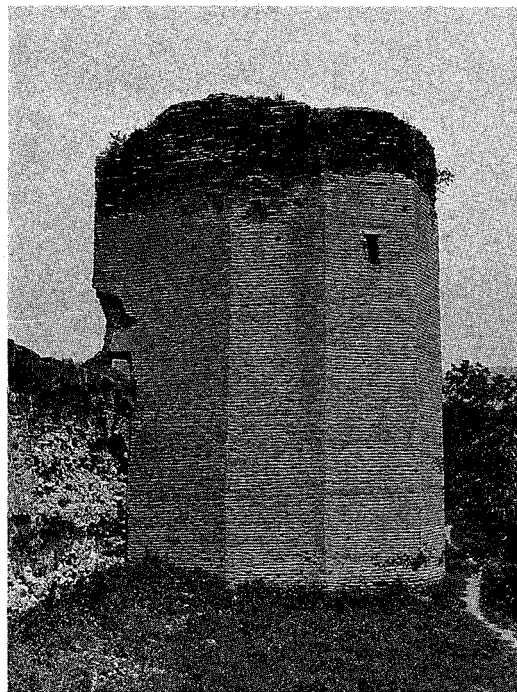
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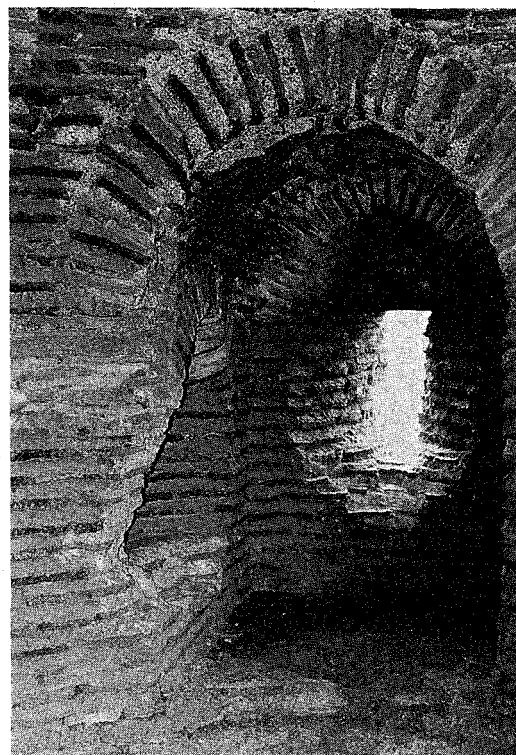




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Fig. 16 – Tower 23

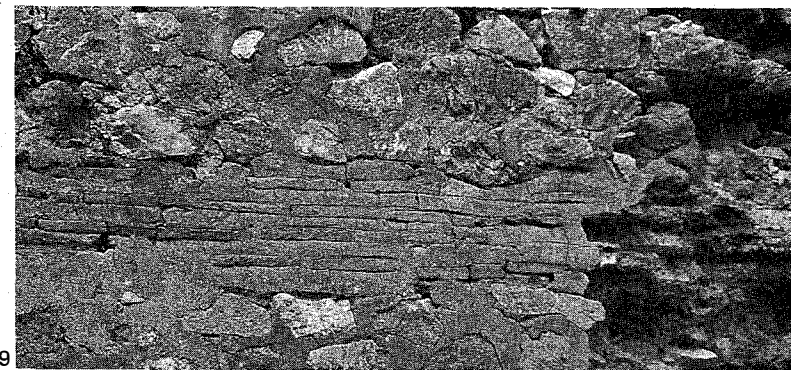
Fig. 17 – T23, loophole of upper chamber

Fig. 18 – T25, upper chamber: wall in brickwork [A3] on left with reinforcement in crude alternating brick [D4]; note holes of cribwork in both parts

Fig. 19 – W25/26, with irregular brick bands [C2]

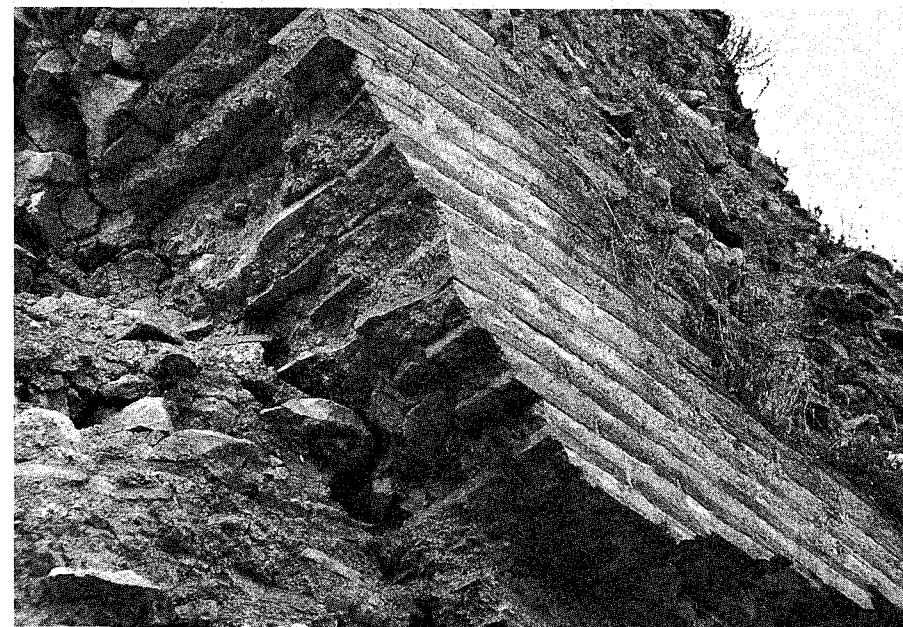
Fig. 20 – T29, brick [A6]; note lack of recessed brick

Fig. 21 – T37, recessed brick [B1] with cloisonné



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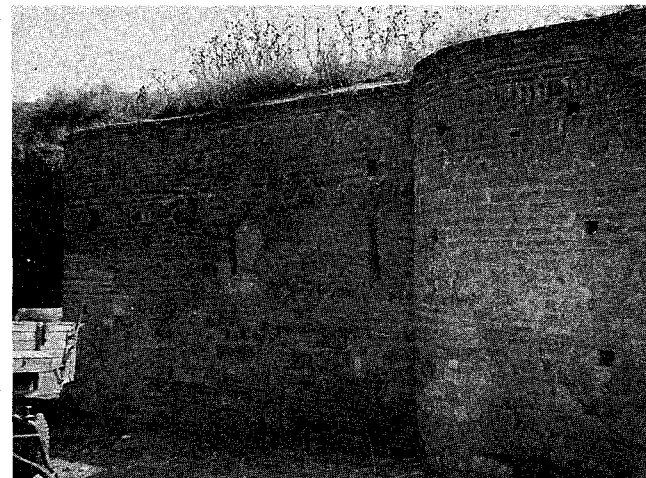


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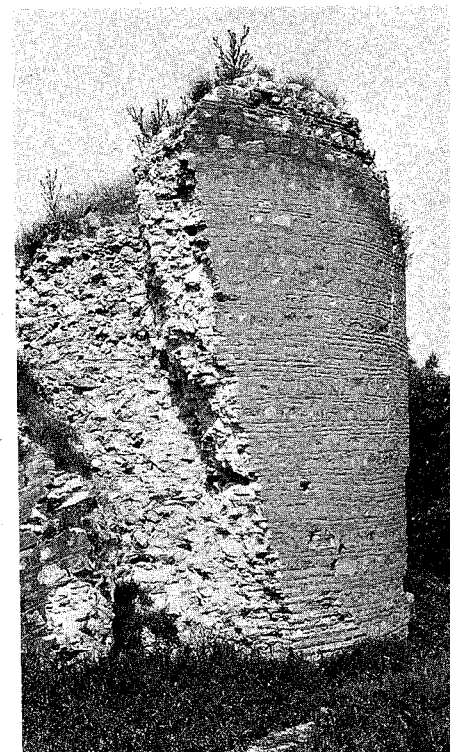
Fig. 22 – T37, detail of recessed brick

Fig. 23 – Structure behind T43 of Lefke Gate, elaborate brickwork [C11]

Fig. 24 – T46 with base of spoils and superstructure in crude alternating brick [B2]; on the left, W45/46 of masonry [C1] with base of spoils



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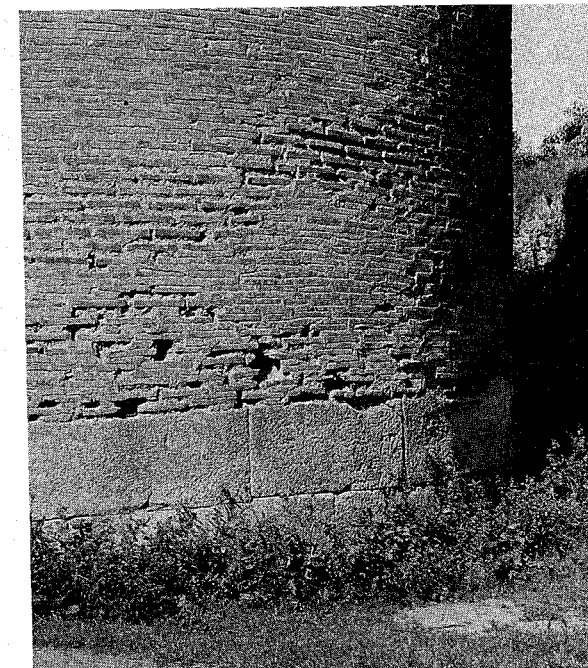


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Fig. 25 – T58 with elaborate cloisonné [C10]; note recessed brick near bottom

Fig. 26 – T68 at Istanbul Gate, with base of fine spoils [F5] and superstructure in brick [A1]

Fig. 27 – T70 with facing of spoils and cornice [F1]



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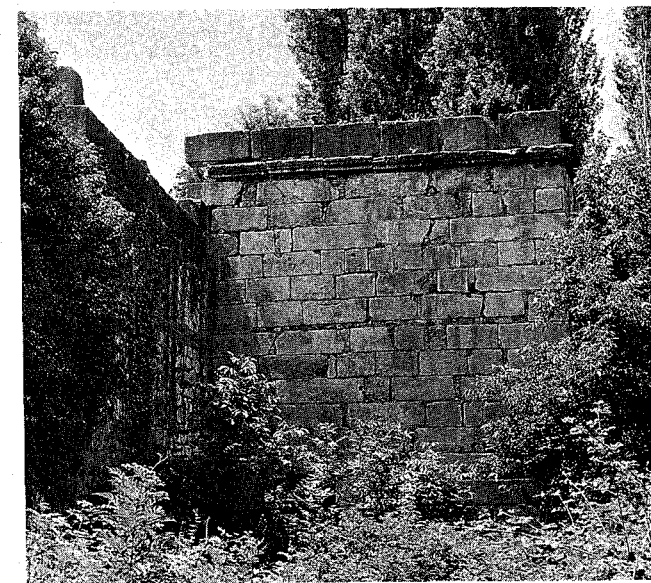




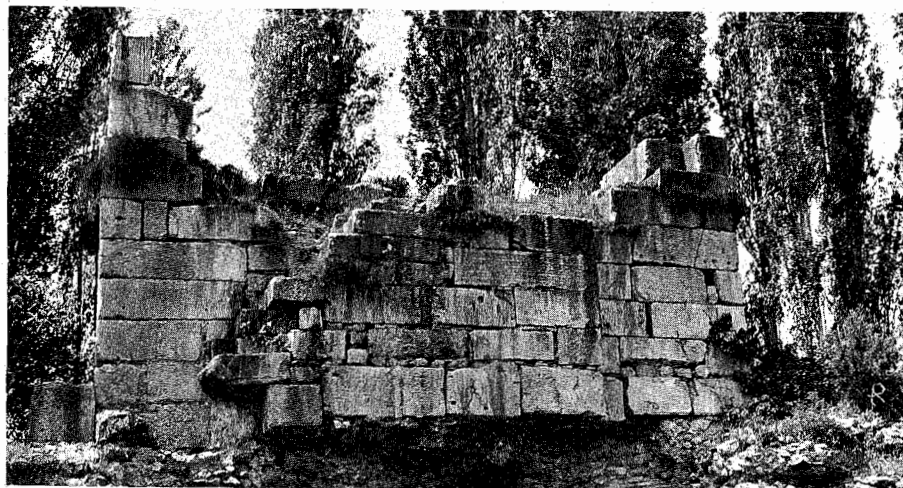
Fig. 28 – T71, detail of spoils [F1]

Fig. 29 – T71, inner face with inscription of Leo III and Constantine V

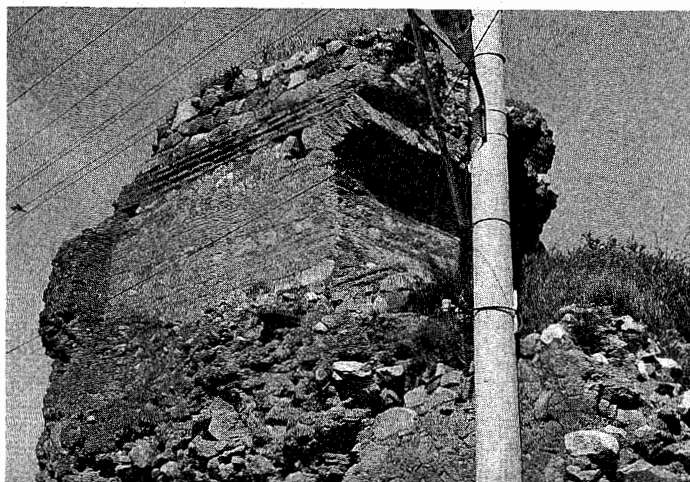
Fig. 30 – T76 with superstructure of banded masonry [C6]

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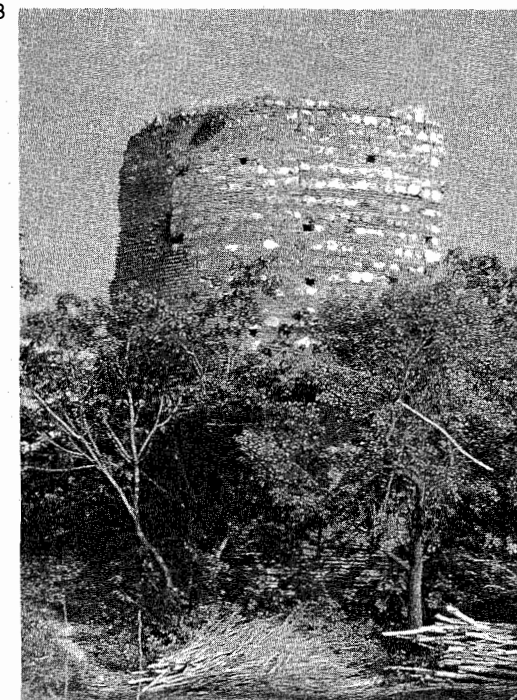


Fig. 31 – W78/79, banded masonry [C7]

Fig. 32 – T83, detail of facing in alternating brick [D1]

Fig. 33 – T84 in elaborate banded masonry [C9] with raising in [D4]; note blocked crenellations



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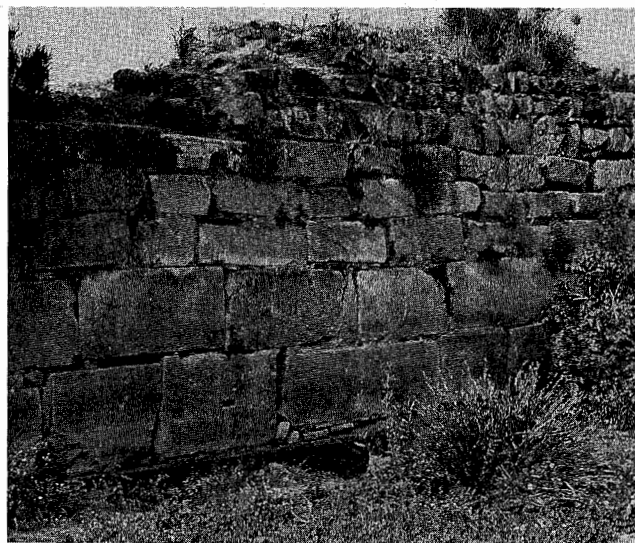
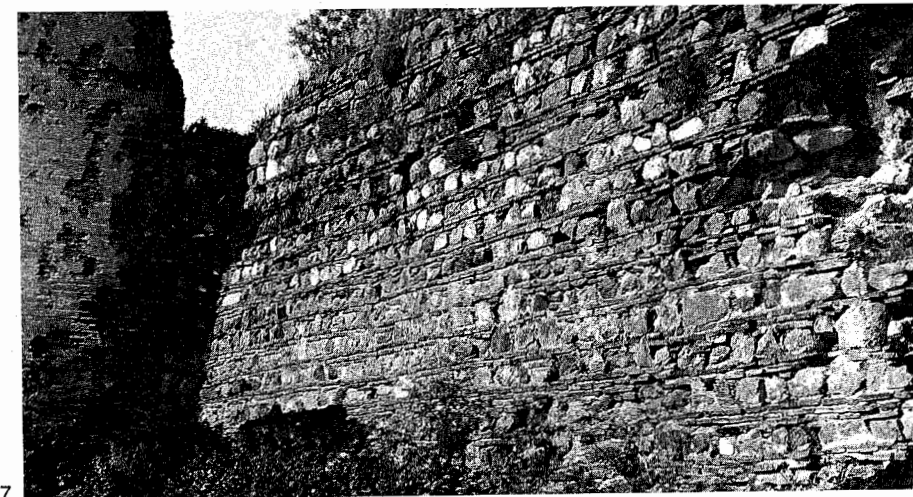


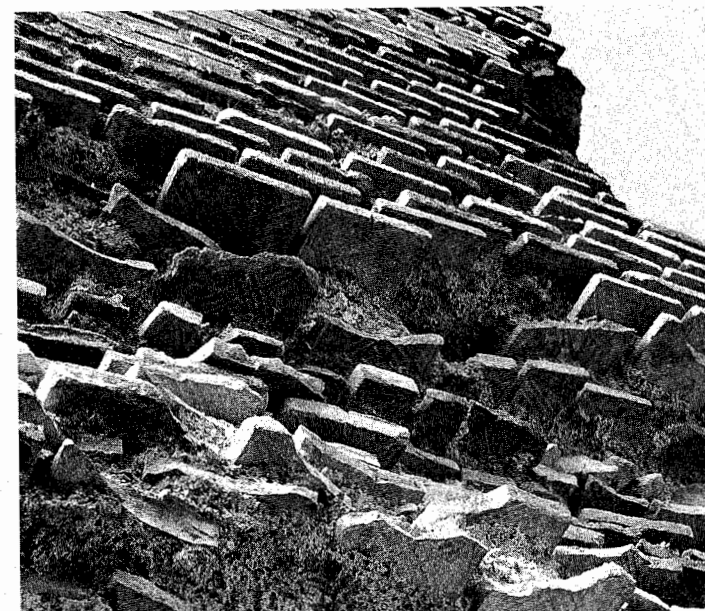
Fig. 34 – T88, complex banded masonry [C8]; note carved capital with cross, bottom center

Fig. 35 – W88/89, 'covered' brick with cloisonné [B4]

Fig. 36 – W89/Lake with facing of spoils [F1, F2]



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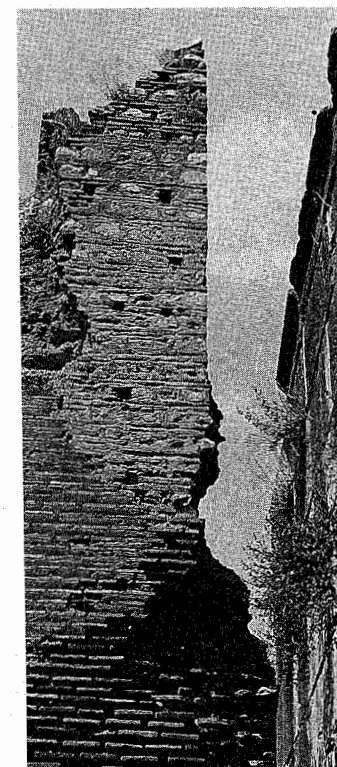


Fig. 37 – W89/90, alternating brick [D1]

Fig. 38 – T93, original brickwork [A1]; note diagonal striations on bricks *Aufung*

Fig. 39 – On the left, T93 with superstructure in alternating brick [D2]; on the right, T94 of spoils [F1]

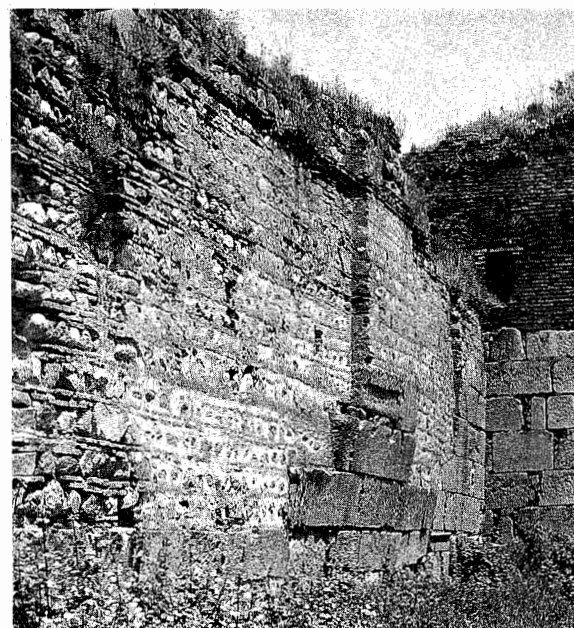


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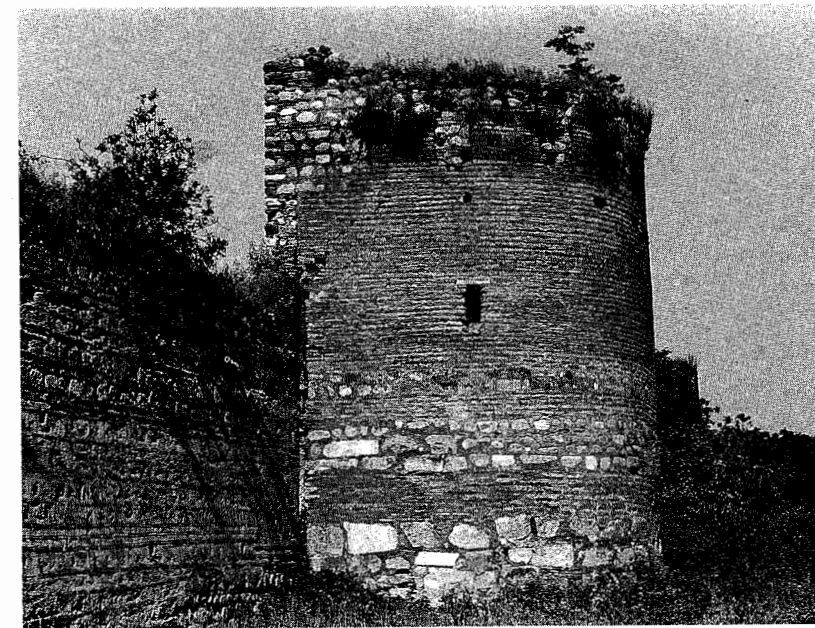


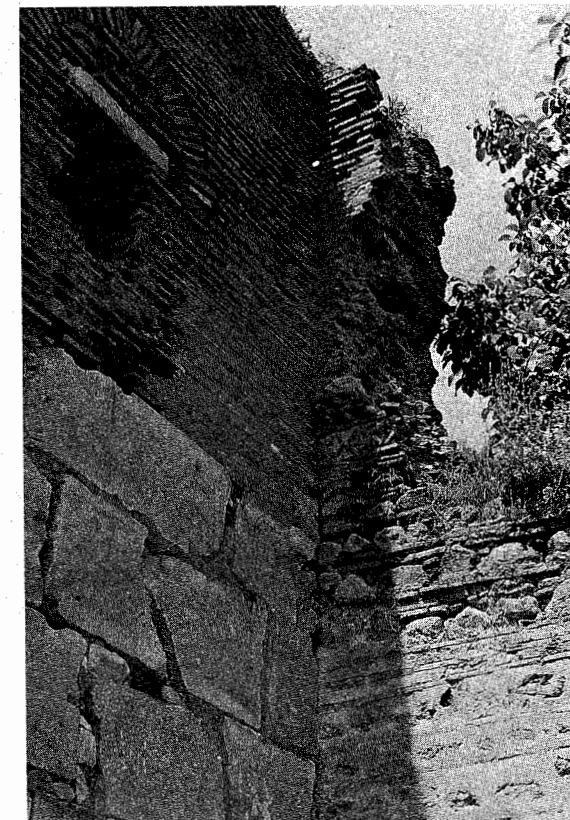
Fig. 40 – W94/95 inner face; cloisonné with spoils [C5]

Fig. 41 – W95/96 'covered' brick [B2] with frieze

Fig. 42 – T96 with base of spoils [F6], superstructure in brick [A3], and W95/96; note left section where mortar is missing

Fig. 43 – T96, connection with decorated wall W96/97

Fig. 44 – T97 with base of spoils and banded masonry [C3], note preserved crenellations; and W96/97 in elaborate covered brick [B3]



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Fig. 45 – W97/98
inner face; arch filled with
banded masonry [C4];
repairs in alternating brick [D2]



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Fig. 46 – T106, base [F6]

Fig. 47 – T106, cloisonné [E1]

Fig. 48 – T106, chamfered mortar

Fig. 49 – T106B, of spoils [F3]

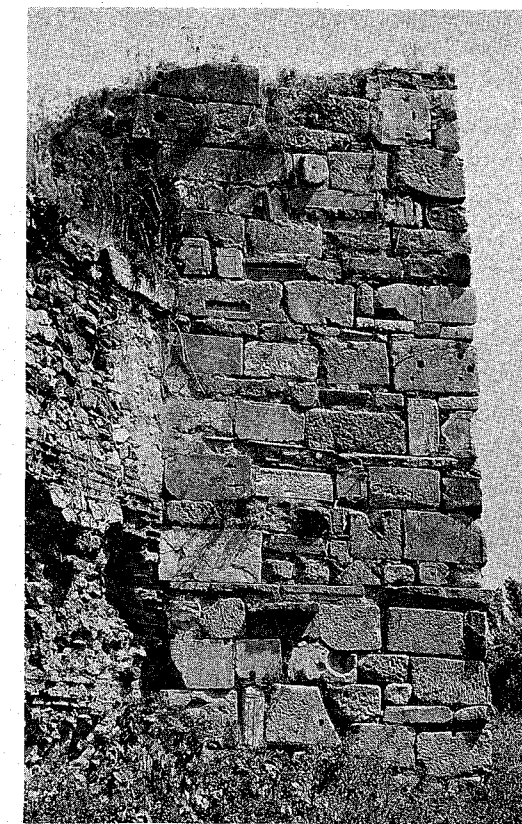


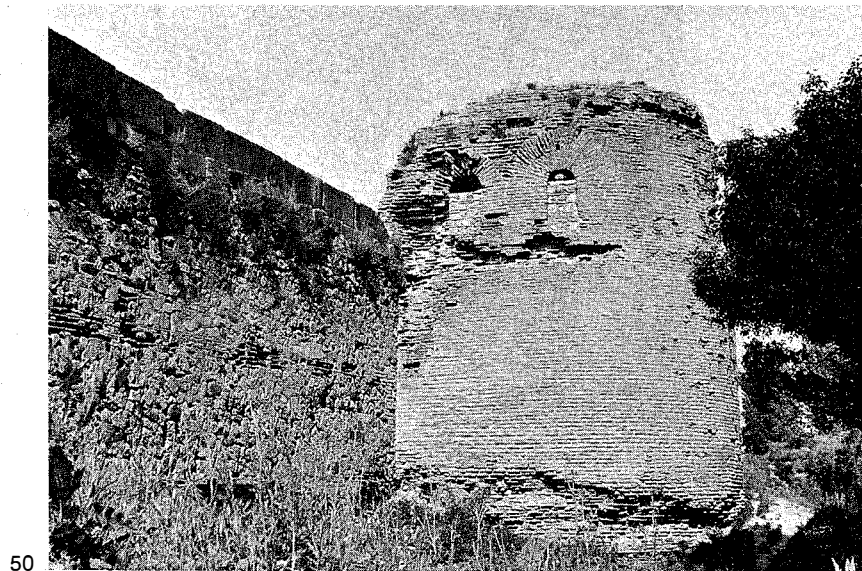
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Fig. 50 – T108 with blocked embrasures

Fig. 51 – W108/110 masonry [C2] with much mortar on surface

Fig. 52 – W111/112, covered brick [B4] with cloisonné and herringbone design

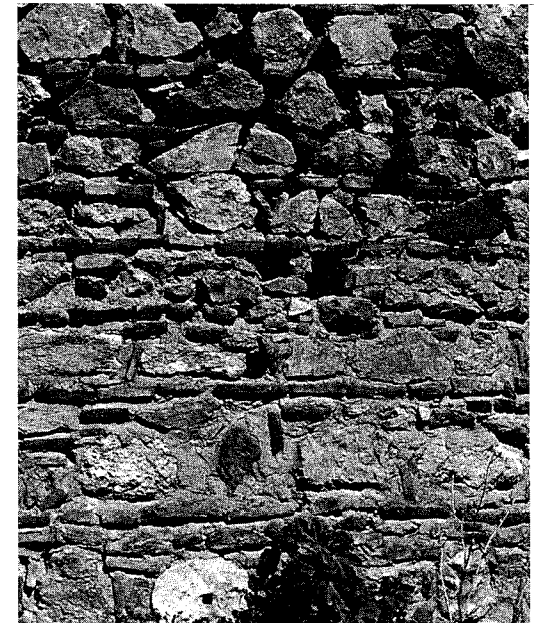
Fig. 53 – Outer Wall, detail of typical masonry on T110a

Fig. 54 – Outer Wall: T43a at Lefke Gate: spoils, 'covered' brick, brick [A4], and herringbone decoration

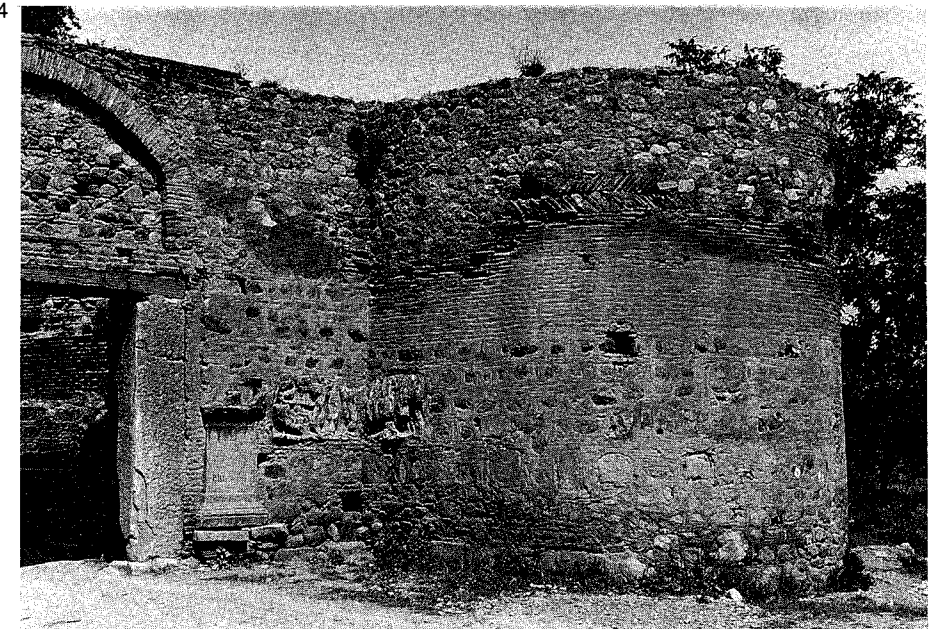


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PART THREE
Fortifications of Asia Minor

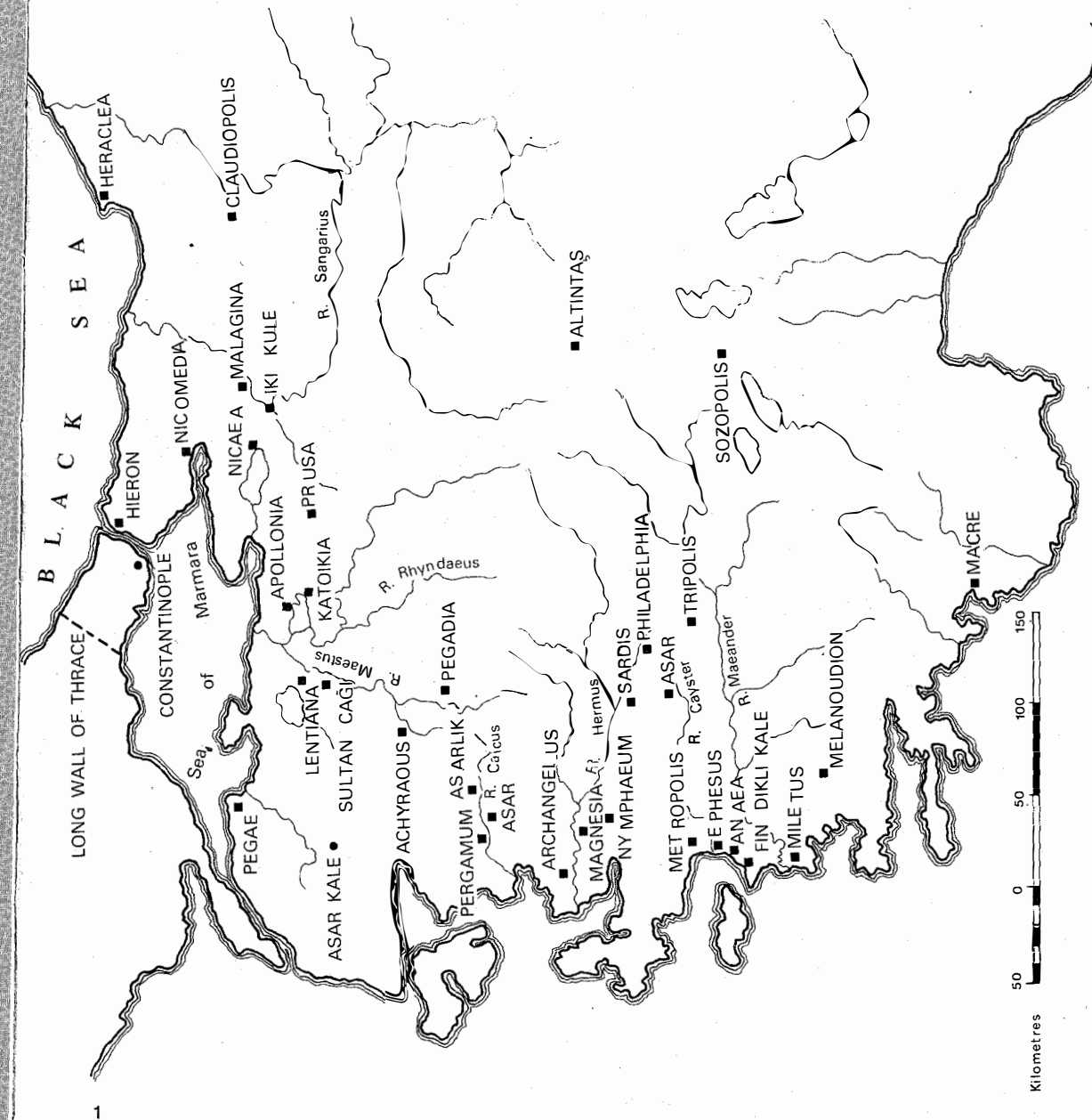
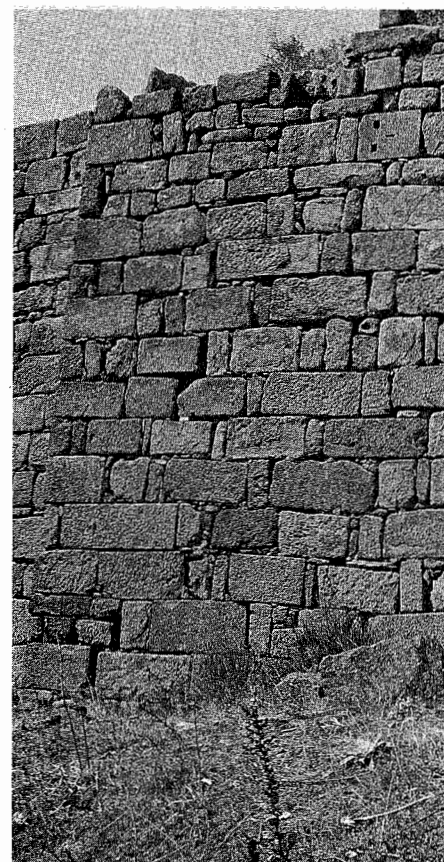
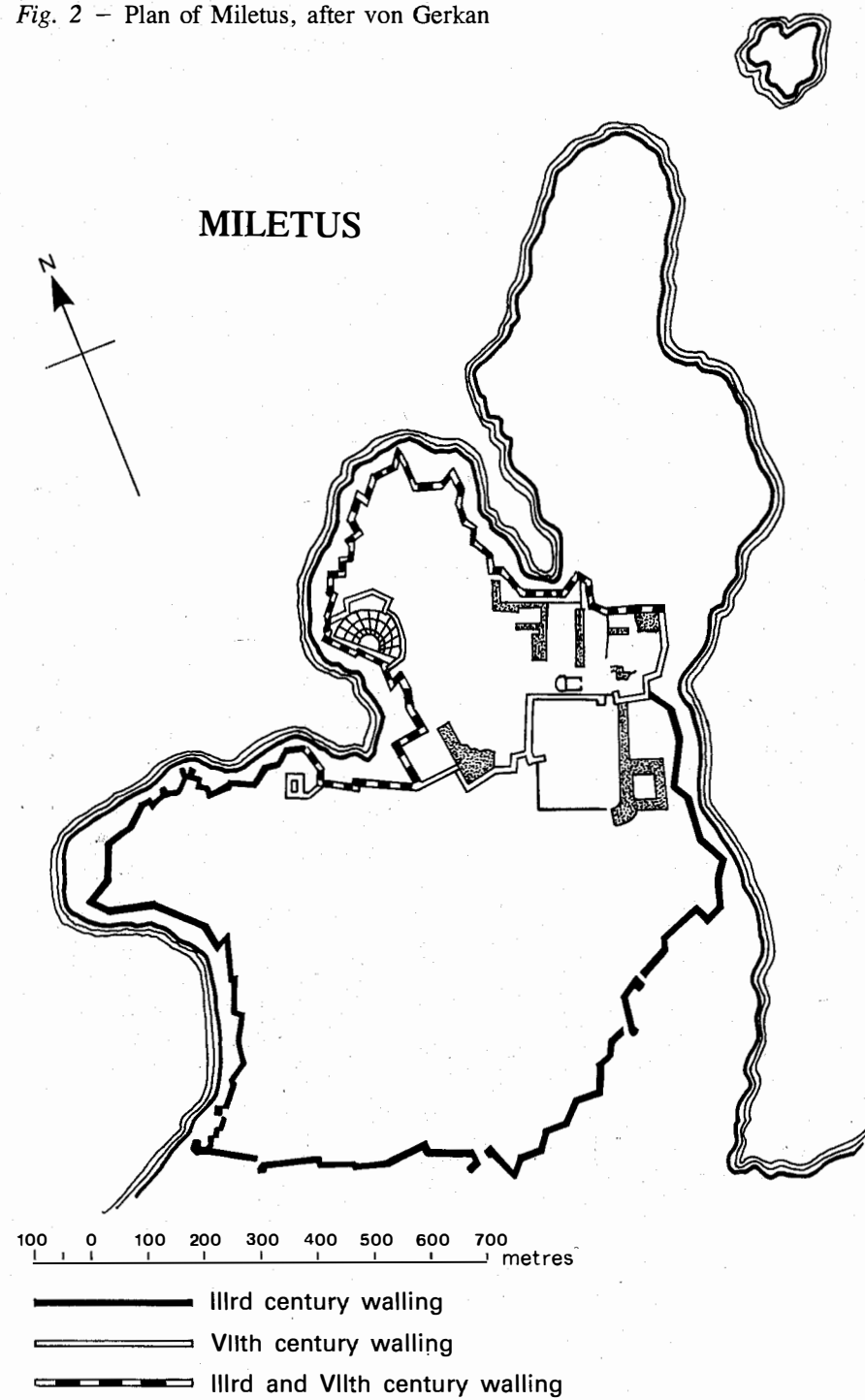
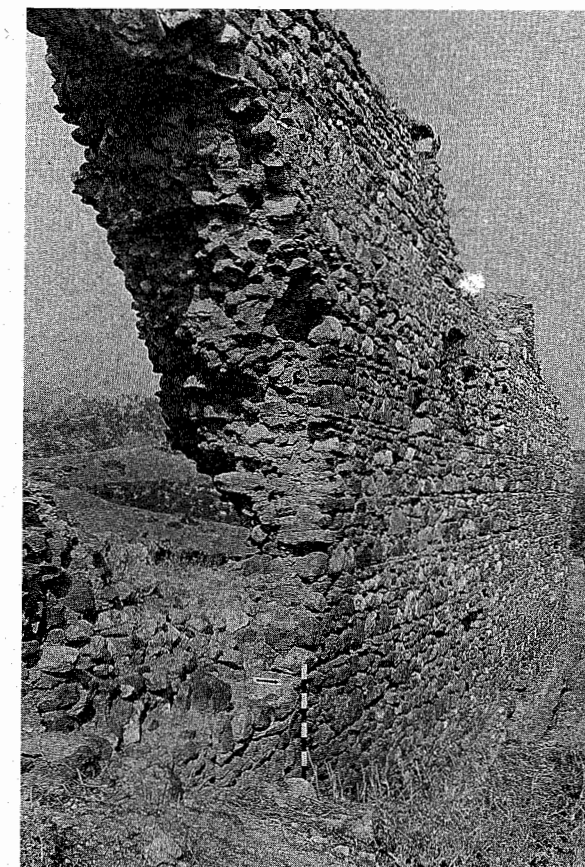


Fig. 1 - Map of western Asia Minor, showing sites here discussed

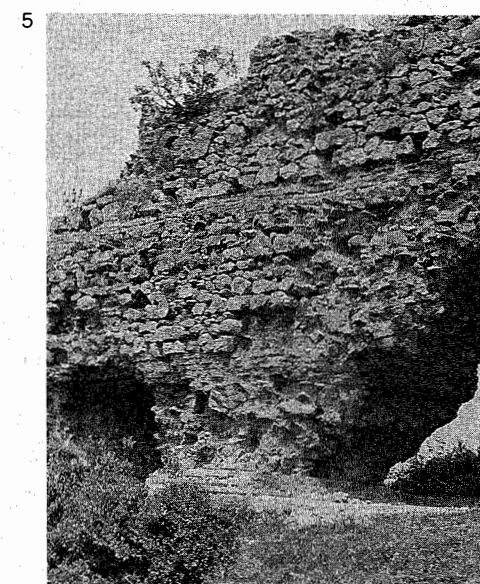
Fig. 2 — Plan of Miletus, after von Gerkan



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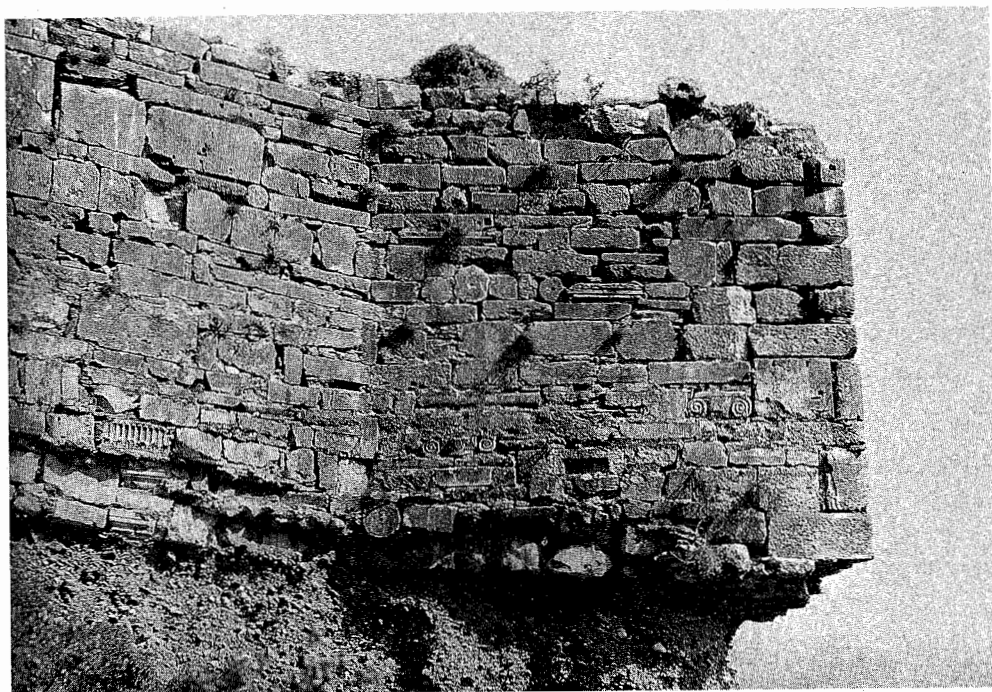


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Fig. 3 — Pergamum: third-century wall

Fig. 4 — Sardis: city wall

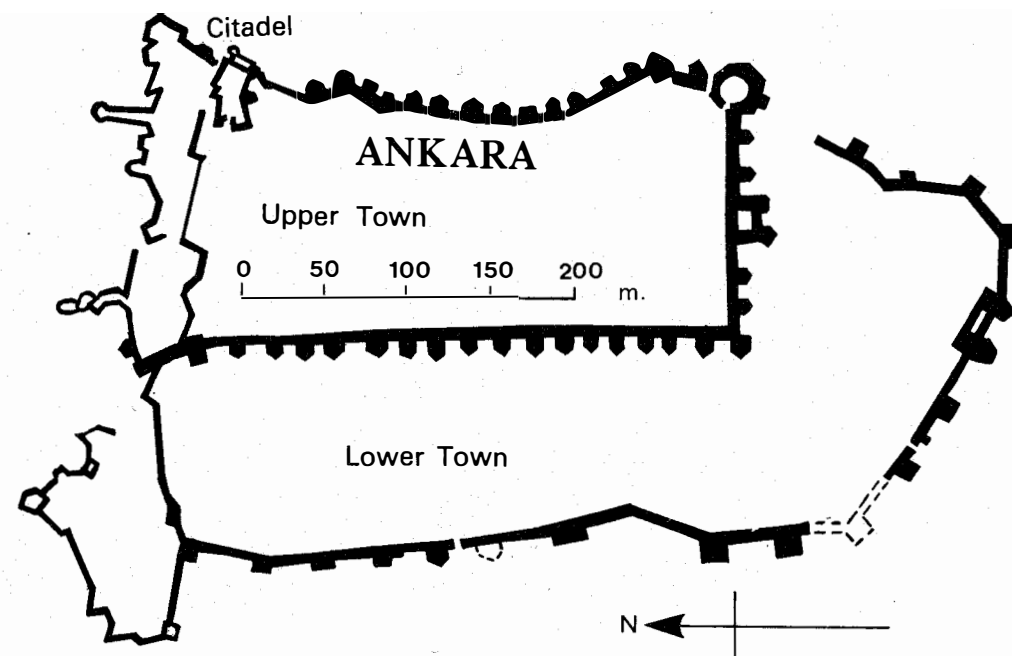
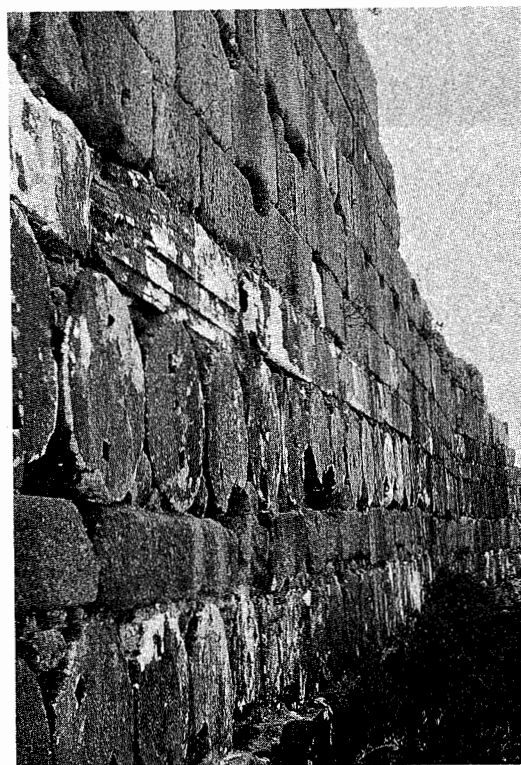
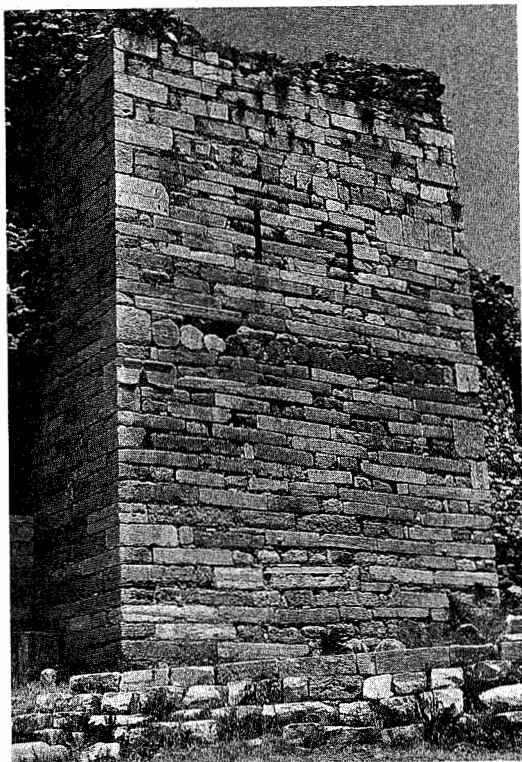
Fig. 5 — Nicomedia: tetrarchic wall



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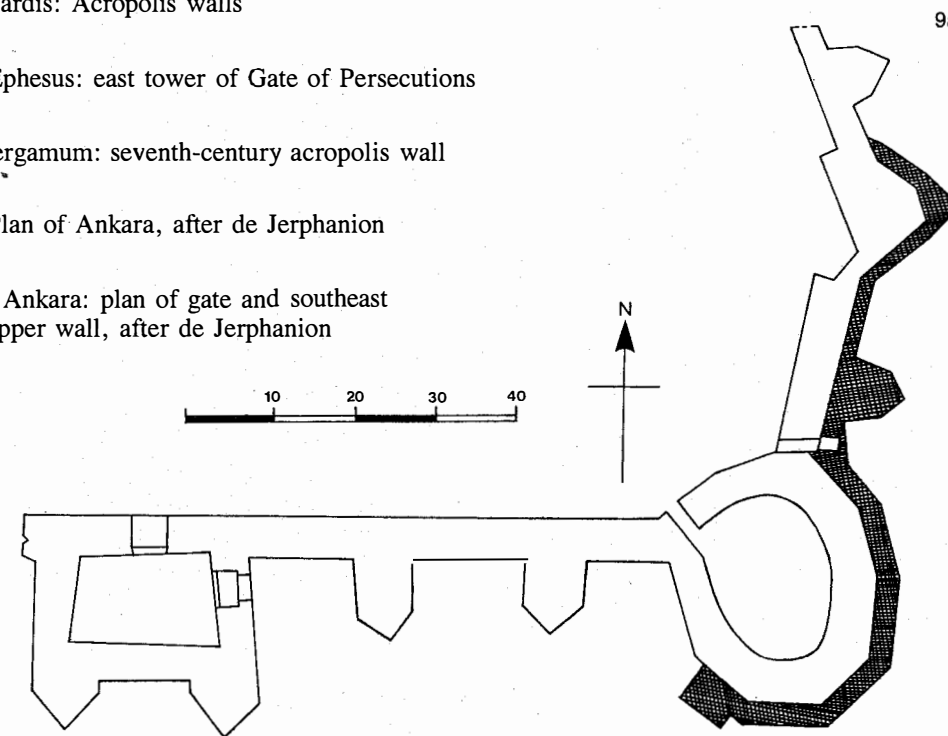
Fig. 6 – Sardis: Acropolis walls

Fig. 7 – Ephesus: east tower of Gate of Persecutions

Fig. 8 – Pergamum: seventh-century acropolis wall

Fig. 9 – Plan of Ankara, after de Jerphanion

Fig. 9a – Ankara: plan of gate and southeast corner of upper wall, after de Jerphanion



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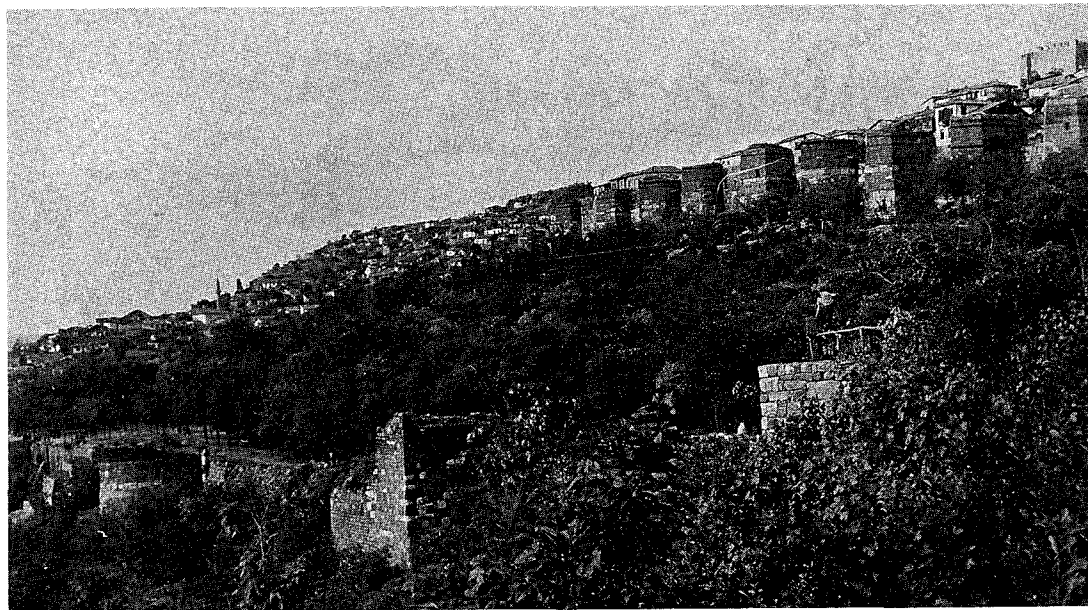
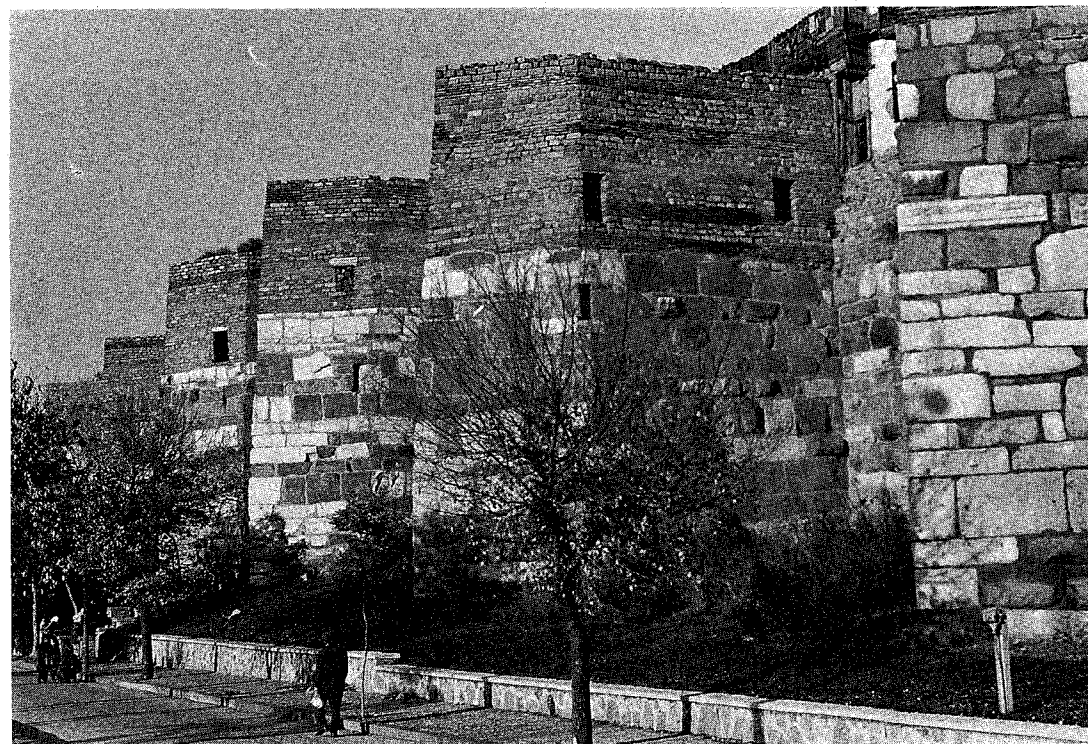
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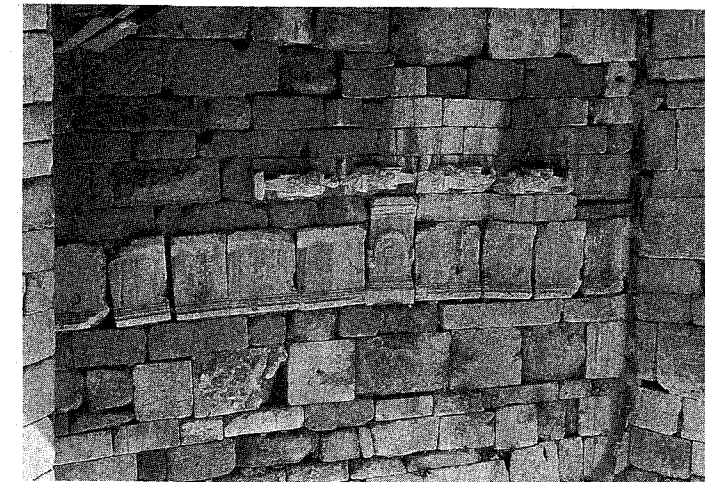
Fig. 10 — Ankara:
general view of upper
and lower walls;
citadel at upper right

Fig. 11 — Ankara:
pentagonal towers
of upper wall

Fig. 12 — Ankara:
decorative masonry of
south gate, upper wall

Fig. 13 — Prusa:
detail of masonry

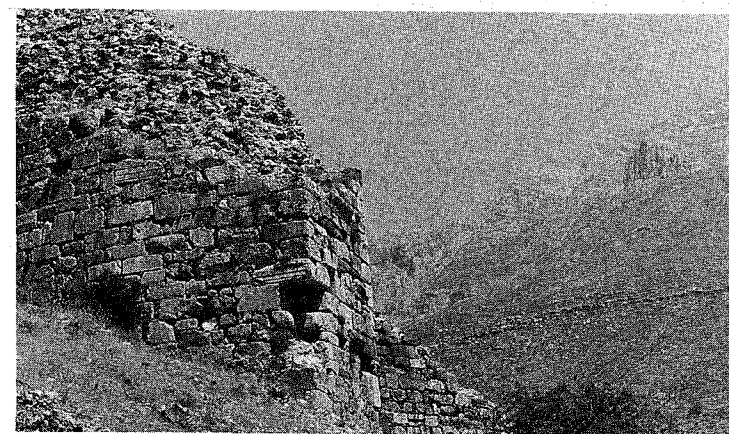
Fig. 14 — Sozopolis:
tower and wall



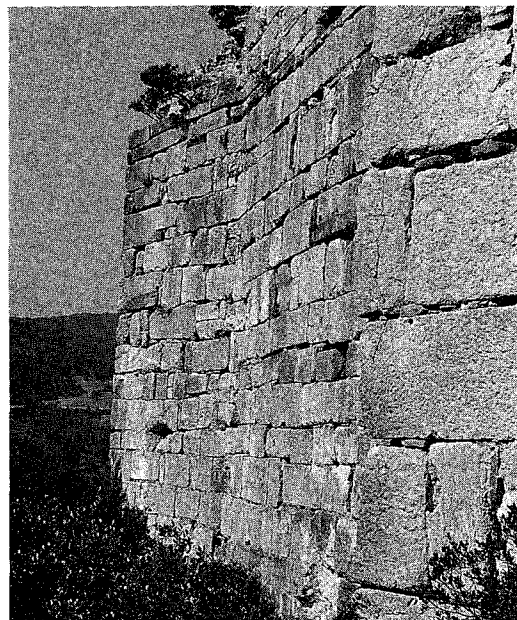
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Fig. 15 – Malagina: masonry of south wall

Fig. 16 – Hala Hisar, Claudiopolis:
remains of walls

Fig. 17 – Asar Kale (Mysia): general view

Fig. 18 – Ankara: east tower
of south gate of lower wall

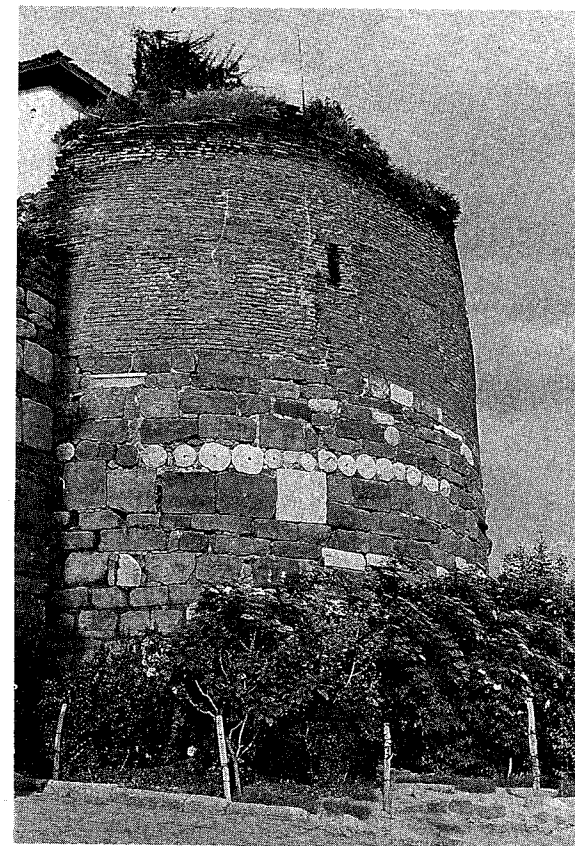
Fig. 19 – Ankara: tower with inscription
(on stone with cross)
and masonry of Michael III

Fig. 20 – Lopadium: semicircular tower

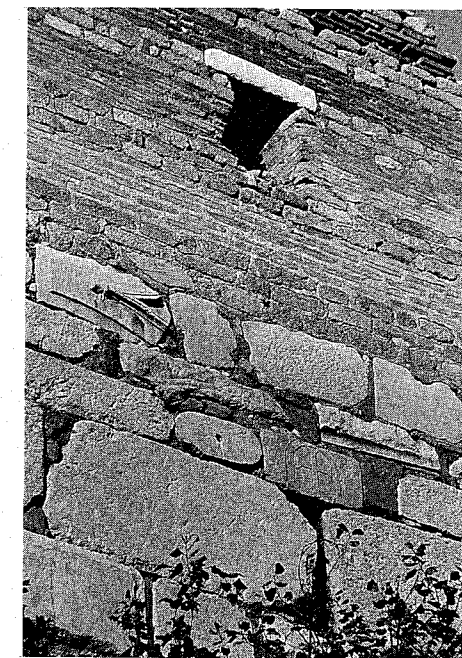


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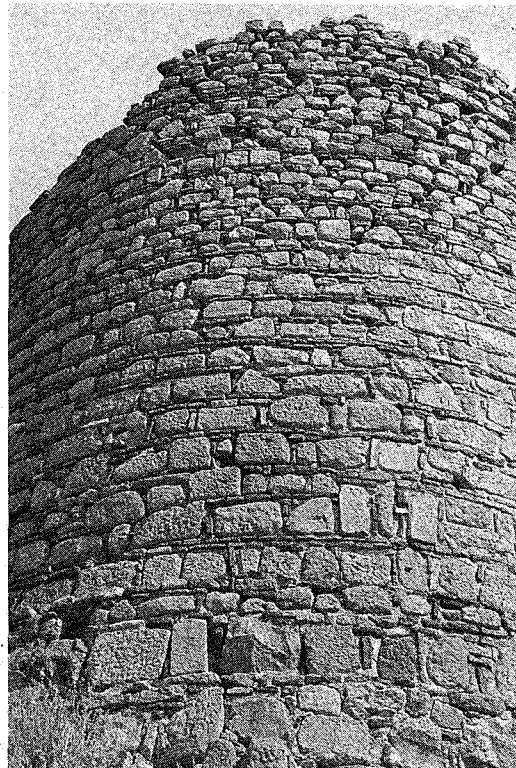
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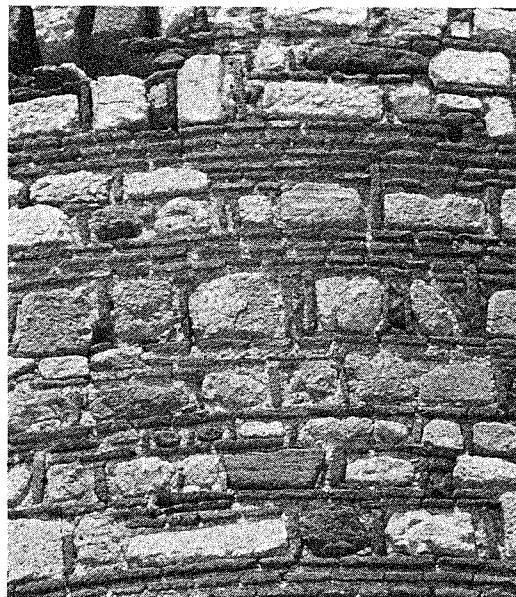


Fig. 21 – Achyraous: surviving towers

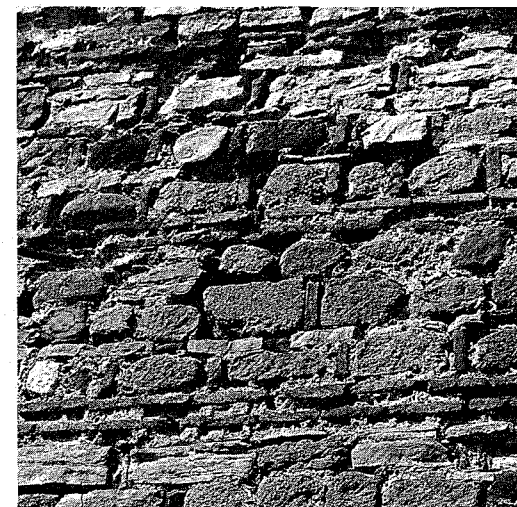
Fig. 22 – Achyraous: detail of masonry

Fig. 23 – Pergamum: tower of lower wall of Manuel Comnenus

Fig. 24 – Asar (Caicus): detail of masonry

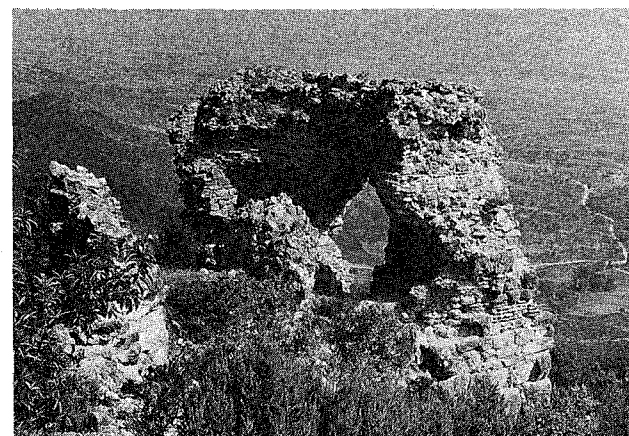
Fig. 25 – Malagina: platform with embrasures

Fig. 26 – Hieron: section of lower walls

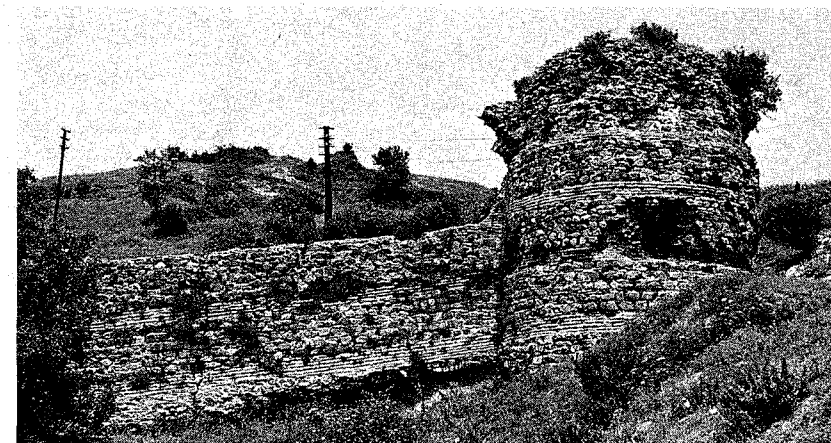


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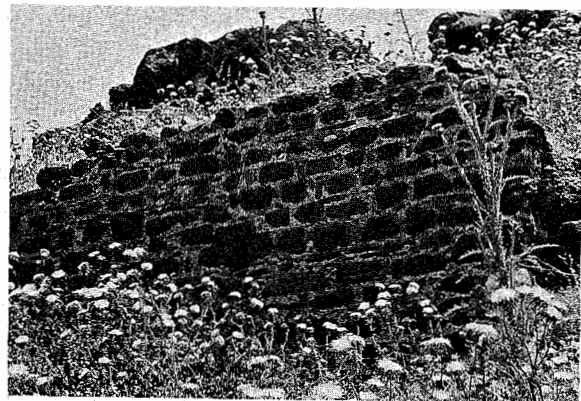
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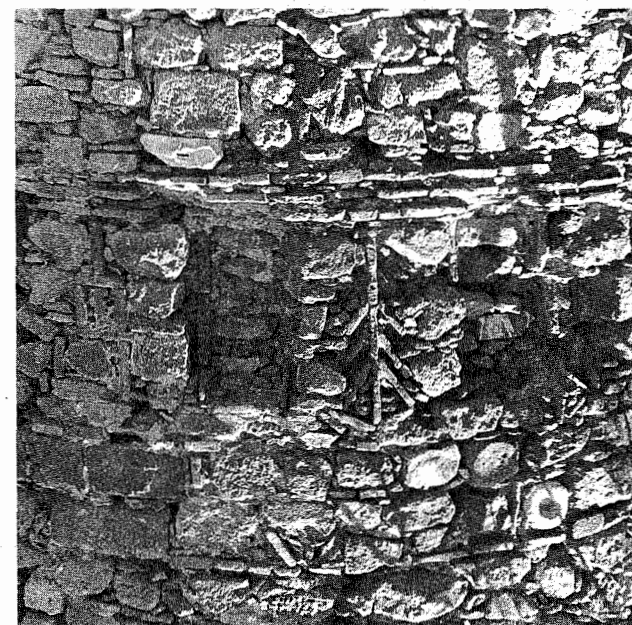
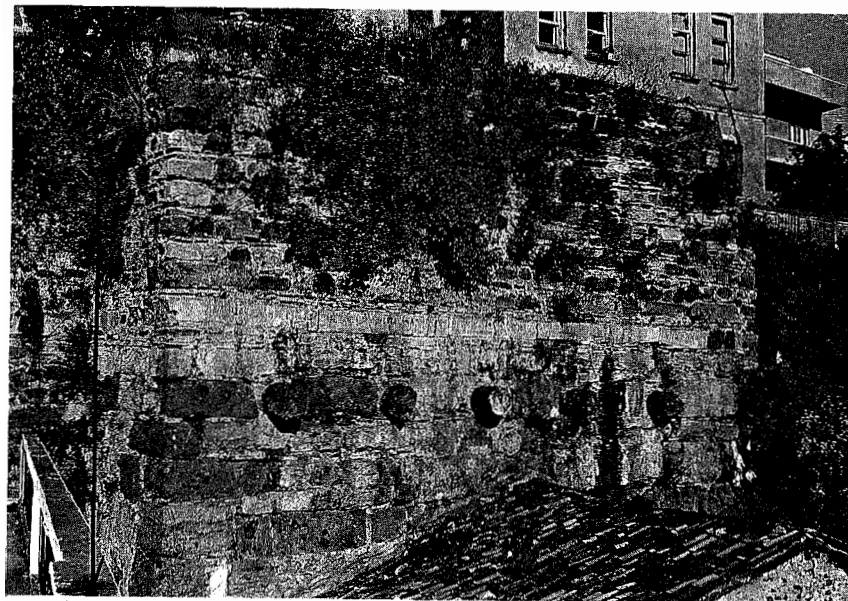


Fig. 27 – Archangelus: north wall

Fig. 28 – Archangelus: tower

Fig. 29 – Heraclea Pontica: tower with inscription. Photo by Cyril Mango

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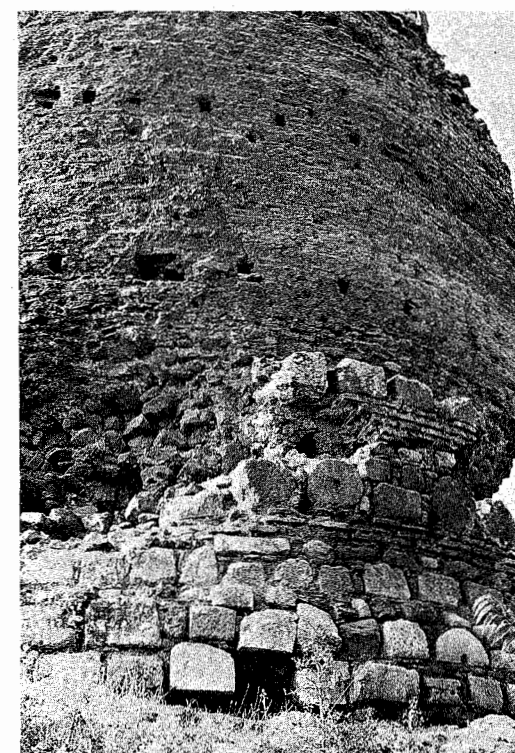
Fig. 30 – Smyrna: tower of citadel with brick decoration

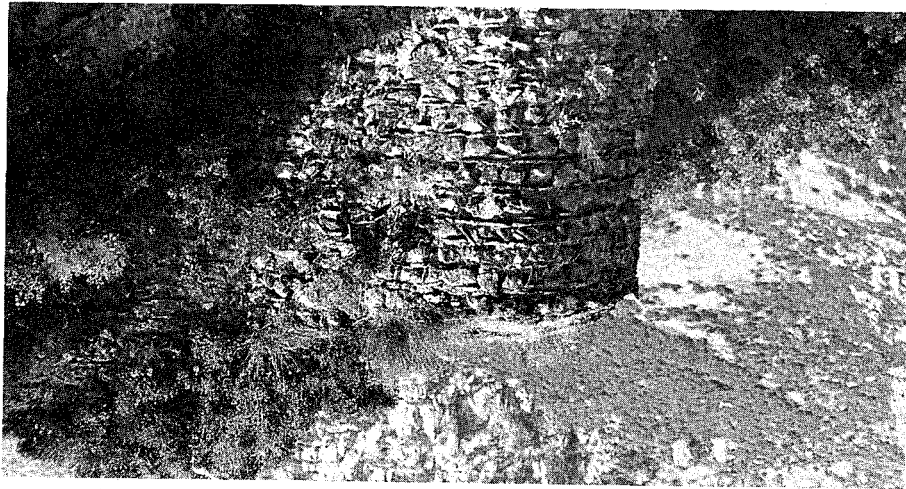
Fig. 31 – Magnesia: east tower of gate

Fig. 32 – Magnesia: tower of citadel with brick decoration

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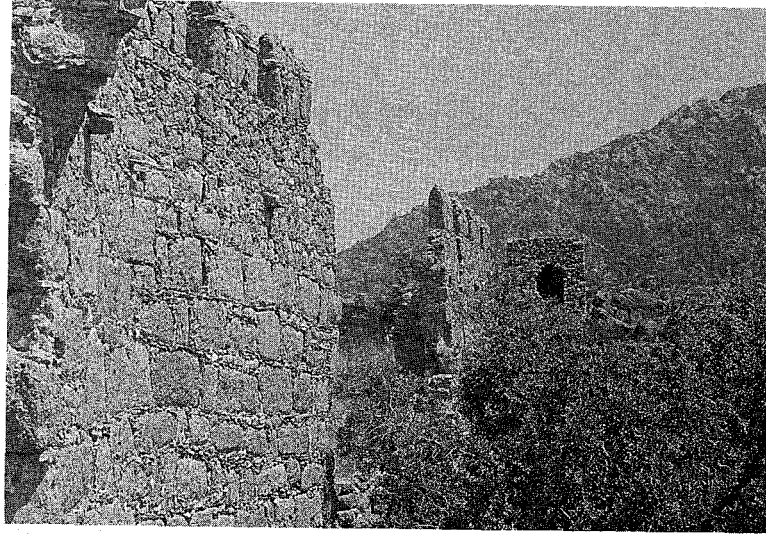
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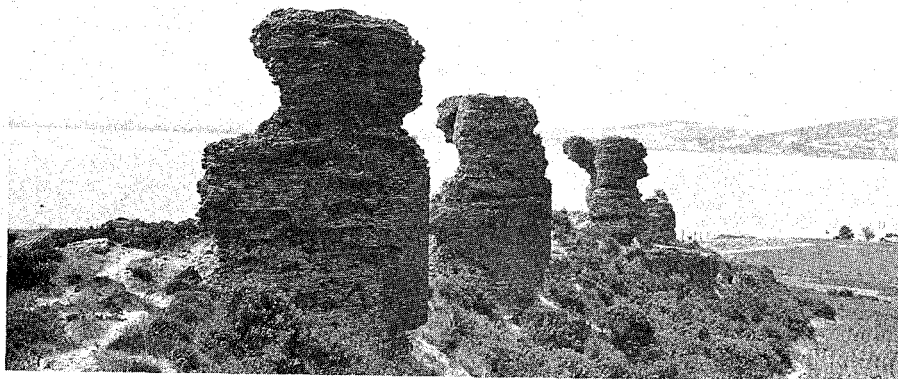


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*Fig. 33 – Nymphaeum:
tower of lower wall*

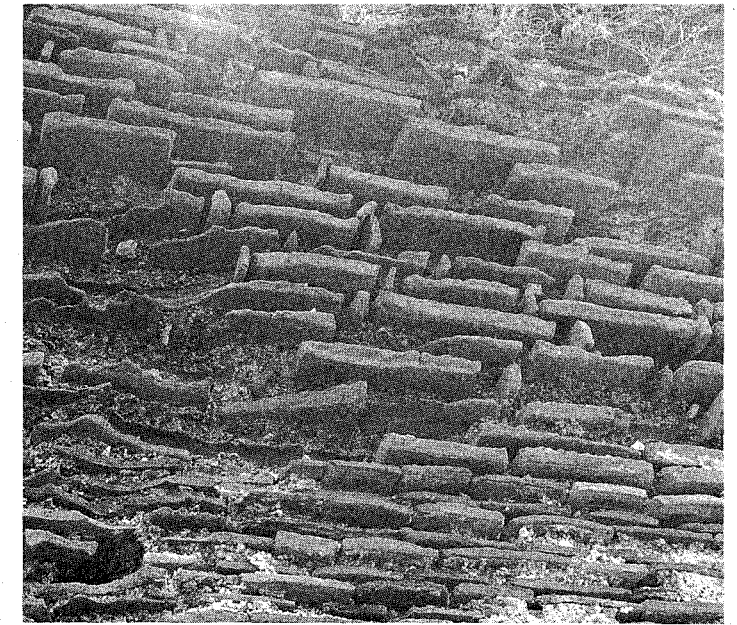
*Fig. 34 – Melanoudion:
masonry of walls*

*Fig. 35 – Pegae:
main wall, general view*

*Fig. 36 – Pegae:
detail of brickwork*

*Fig. 37 – Pegae:
wall with decorative brick*

*Fig. 38 – Lentiana:
tower*



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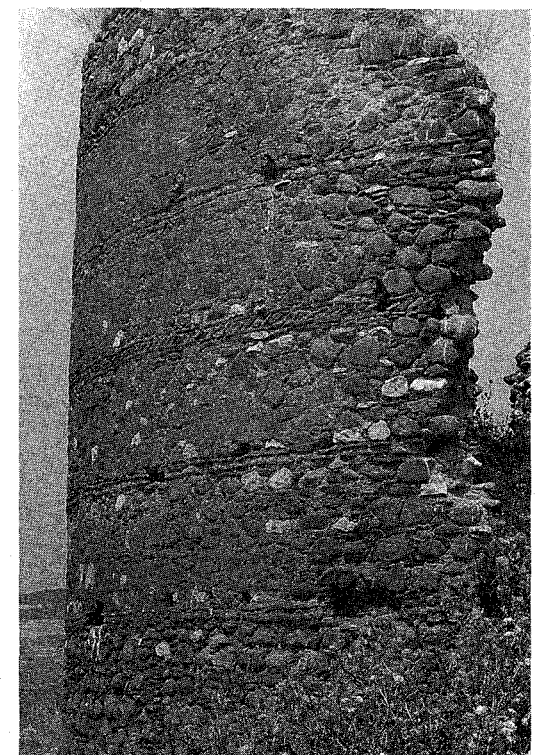
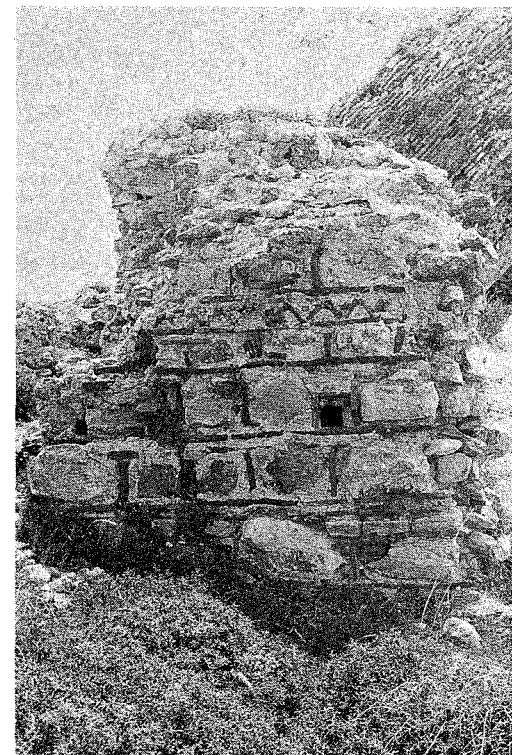


Fig. 39 – Iki Kule: open-gorge tower

Fig. 40 – Katoikia: section of wall

Fig. 41 – Metropolis (Ionia):
typical section of lower wall

Fig. 42 – Nymphaeum:
detail of late wall of citadel



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Clive Foss is Professor of History at the University of Massachusetts, Boston, where he has taught since 1967. A native of London, he was educated at Harvard University, receiving his AB in Classics, AM in History and PhD in History & Classical Archaeology. After taking his first degree, he spent a year at the American School of Classical Studies in Athens, where he first made his acquaintance with the Byzantine Empire and its fortresses. He has also taught at the University of Lyons (1977-1979), the University of California (1985) and at UNISA (1981). He has held visiting fellowships at the Dumbarton Oaks Center for Byzantine Studies and at All Souls College, Oxford: and grants from the National Endowment for the Humanities, the Guggenheim Foundation, the Centre national de recherche scientifique (Paris) and the American Council of Learned Societies.

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